

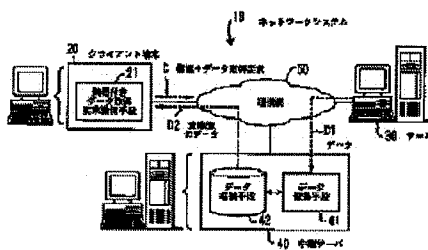
NETWORK SYSTEM, CLIENT TERMINAL AND RELAY SERVER

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Abstract of JP11149448

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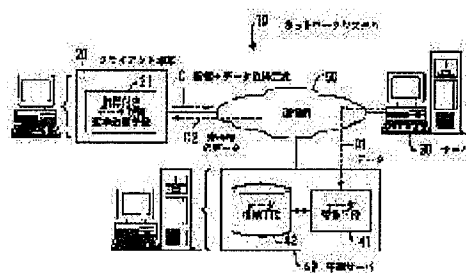
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CLAIMS

[Claim(s)]

[Claim 1] In the network system which performs data transmission in the network of a client-server mold In case data are acquired from the server which performs information offer, and said server, the index about data transmission information is added to a data acquisition demand. A client terminal including a data acquisition demand transmitting means with an index to generate the data acquisition demand with an index and to transmit, A data-conversion means to change said data acquired from said server based on said index, a data storage means to store the data after conversion -- since -- the network system characterized by having the junction server which is constituted and performs junction control with said server and said client terminal.

[Claim 2] Said data acquisition demand transmitting means with an index is a network system according to claim 1 characterized by making the communication link condition and the self throughput of a communication network into said data transmission information.

[Claim 3] Said client terminal is a network system according to claim 2 characterized by having a cellular-phone function and making field strength into said index about the communication link condition of said communication network.

[Claim 4] Said network system is a network system according to claim 1 characterized by performing said data transmission using a HTTP protocol.

[Claim 5] Said data acquisition demand transmitting means with an index is a network system according to claim 4 characterized by making the number of versions of said HTML into said index when said data are HTML.

[Claim 6] Said data acquisition demand transmitting means with an index is a network system according to claim 1 characterized by making a self viewable size into said index when said data are an image file.

[Claim 7] Said data-conversion means is a network system according to claim 6 characterized by changing said data below into said viewable size when said index is the viewable size of said client terminal.

[Claim 8] Said data acquisition demand transmitting means with an index is a network system according to claim 1 characterized by making into said index the color number which can express said client terminal when said data are GIF.

[Claim 9] Said data-conversion means is a network system according to claim 1 which said data are image data, and is characterized by changing said image data and reducing said image data quality when the communication link condition of said communication network is bad.

[Claim 10] Said junction server is a network system according to claim 1 characterized by performing said junction control to said data stored in said data storage means, without accessing said server when the data again demanded from said client terminal are the same.

[Claim 11] Said junction server is a network system according to claim 1 characterized by performing said junction control to said data within said data storage means when said data updated from said server when the data in said server were updated are acquired, said junction control is performed and the data in said server are not updated.

[Claim 12] Said junction server is a network system according to claim 1 characterized by performing said junction control to said data which said client terminal stores, said data which said data storage means stores, and ***** or said new data.

[Claim 13] The client terminal characterized by having a data acquisition demand transmitting means with an index to add the index about data transmission information to a data acquisition demand, to generate the data acquisition demand with an index, and to transmit in the client terminal which acquires data from the server which performs information offer in case said data are acquired from said server.

[Claim 14] The junction server characterized by having a data-conversion means to change said data acquired from said server based on said index in the junction server which performs junction control with the server which performs information offer, and the client terminal which acquires data from a server, and a data storage means to store the data after conversion.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention relates to the server which the network system which performs data transmission in the network of a client-server mold, and the client terminal which acquires data from the server which performs information offer are performed, and performs information offer, and the junction server which performs junction control with the client terminal which acquires data from a server about a network system, a client terminal, and a junction server.

[0002]

[Description of the Prior Art] In recent years, the opportunity of the multimedia communication which communicates combining a text, an image, voice, etc. integrative has been growing quickly with an advance of a network technique.

[0003] In multimedia communication, in case other terminals on a network are provided with various services, the information offer server is used. An information offer server transmits various multimedia data, such as text data, image data, and voice data, to a partner terminal.

[0004] Drawing 17 is drawing showing the data transmission configuration of an information offer server and a terminal. It connects with a communication network 50 using an attached communication network interface (not shown), and the information offer server 300 connects a terminal 200 with a communication network 50 through the gateway 400. And a communication link is performed between a terminal 200 and the information offer server 300.

[0005] In case a terminal 200 downloads data from the information offer server 300, a connection physical between a terminal 200 and the information offer server 300 or imagination is established. And a data acquisition demand is made from a terminal 200 on this connection, and that data is transmitted from the information offer server 300.

[0006] In this case, the name of the data which the information offer server 300 has is specified as the data acquisition demand from the terminal 200, and the information offer server 300 which obtained this transmits the data which are in agreement with the name of data to a terminal 200. Then, a connection is cut or an acquisition demand to other data is made again.

[0007]

[Problem(s) to be Solved by the Invention] However, in the above conventional data transmission, the information offer server 300 was transmitting the data stored regardless of the condition of a communication network 50. For this reason, even when the transmission capacity of a communication network 50 is low, the data of a large quantity will be sent, for example, and there was a problem that that a terminal 200 acquires data took time amount.

[0008] Moreover, the information offer server 300 was transmitting the stored data as it was, without taking the classification and the throughput of a partner terminal into consideration. For this reason, there was only no memory which stores data in a terminal 200, and the indicative data exceeding the capacity which can display a terminal 200 was transmitted and carried out, and there were problems, such as relaxation.

[0009] It aims at offering the network system which this invention is made in view of such a point, performs data conversion according to conditions, such as a communication link condition and a throughput of a terminal, and performs data transmission efficiently.

[0010] Moreover, other objects of this invention add conditions, such as a communication link condition and a throughput of a terminal, to data, transmit, and are to offer the client terminal which performs data transmission efficiently.

[0011] Furthermore, other objects of this invention are to offer the junction server which performs data conversion according to conditions, such as a communication link condition and a throughput of a terminal, and performs data transmission efficiently.

[0012]

[Means for Solving the Problem] In the network system which performs data transmission in the network of a client-server mold in order to solve the above-mentioned technical problem in this invention In case data are acquired from the server which performs information offer, and said server, the index about data transmission information is added to a data acquisition demand. A client terminal including a data acquisition demand transmitting means with an index to generate the data acquisition demand with an index and to transmit, A data-conversion means to change said data acquired from said server based on said index, a data storage means to store the data after conversion -- since -- it is constituted and the network system characterized by having the junction server which performs junction control with said server and said client terminal is offered.

[0013] Here, in case it acquires data from a server, the data acquisition demand transmitting means with an index adds the index about data transmission information to a data acquisition demand, generates the data acquisition demand with an index, and transmits it. A data-conversion means changes the data acquired from the server based on an index. A data storage means stores the data after conversion.

[0014]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained with reference to a drawing. Drawing 1 is principle drawing of the network system of this invention. A network system 10 takes the network configuration of a client-server mold, and performs data transmission through a communication network 50.

[0015] moreover, the junction server 40 which performs junction control with the server 30 to which a network system 10 performs information offer, the client terminal 20 which acquires data from a server 30, and a server 30 and the client terminal 20 -- since -- it is constituted.

[0016] In case the client terminal 20 acquires data from a server 30, the data acquisition demand transmitting means 21 with an index adds the index about data transmission information to a data acquisition demand, generates the data acquisition demand C with an index, and transmits it.

[0017] Data transmission information means the communication link condition of a communication network 50, the throughput of client terminal 20 self, etc. here. The junction server 40 transmits this data acquisition demand C with an index to a server 30, and acquires the corresponding data D1 from a server 30.

[0018] The data-conversion means 41 changes the data D1 acquired from the server 30 based on an index, and the data storage means 42 stores the data D2 after conversion. Then, the junction server 40 transmits the data D2 after conversion to the client terminal 20.

[0019] In addition, the junction control which the junction server 40 performs means the transmission control of being as transmitting data, without changing without the need for conversion **** [and], to the client terminal 20 and the data which are transmitted and received between servers 30. [changing based on an index]

[0020] Next, the concrete configuration of the network system 10 of this invention is explained.

Drawing 2 is drawing showing the configuration of a network system 10. The client terminal 20 (it is hereafter called a personal digital assistant 20.) of this invention shall have a PHS function here. Moreover, a personal digital assistant 20 and a server 30 shall perform data transmission on the Internet.

[0021] A personal digital assistant 20 radiocommunicates through a base station 51. A base station 51 is connected with the ISDN network 52. The ISDN network 52 and LAN54 are connected through the

access point 53 used as reception opening at the time of accessing mutually.

[0022] The junction server 40 which performs junction control with a personal digital assistant 20 and a server 30, the server 30 which has database 30a, and ** connect with LAN54. Next, the protocol stack in the data transmission in a network system 10 is explained. Drawing 3 is drawing showing a protocol stack.

[0023] The layer configuration of a personal digital assistant 20 consists of high orders HTTP (Hyper Text Transfer Protocol), TCP/IP, and PPP, PIAFS and STD28. The layer configuration by the side of the personal digital assistant 20 of a base station 51 consists of high orders HTTP, TCP/IP, and PPP, PIAFS and STD28. Moreover, the layer configuration by the side of the ISDN network 52 of a base station 51 is constituted from a high order by HTTP, TCP/IP, and PPP, PIAFS and ISDN.

[0024] The layer configuration by the side of the ISDN network 52 of an access point 53 is constituted from a high order by HTTP, TCP/IP, and PPP, PIAFS and ISDN. The layer configuration by the side of LAN54 of an access point 53 is constituted from a high order by HTTP, TCP/IP, MAC, and physics.

[0025] The layer configuration of the junction server 40 consists of HTTP, TCP/IP, MAC, and physics. The layer configuration of a server 30 consists of HTTP, TCP/IP, MAC, and physics.

[0026] Thus, in a high order layer, it is HTML (Hyper Text Markup Language). TCP/IP is used by the layer under it using the protocol HTTP for exchanging a hypertext. And in the layer not more than this, protocol conversion is suitably performed by each equipment using the protocol for doubling with each equipment.

[0027] First, between a personal digital assistant 20 and an access point 53, PPP is used at the time of data transmission, and the connection of 1 to 1 is decided at it. Furthermore, PIAFS is used between the personal digital assistant 20 and the access point 53 in this case. between the terminal which supports the transmission system of PHS with PIAFS, and a terminal -- an error -- it is a transmission system for performing free transmission.

[0028] Here, the error free-lancer in the wireless section of PHS shall be guaranteed in an access point 53, and data shall be poured to LAN54. Next, detail actuation of a network system 10 is explained. Drawing 4 is the sequence diagram showing the procedure at the time of letting the junction server 40 pass and performing data conversion.

[S1] The link of PIAFS establishes between a personal digital assistant 20, and an access point 53 and **.

[S2] The link of PPP establishes on the link of PIAFS. Thereby, a personal digital assistant 20 and a server 30 are physically connected through an access point 53.

[S3] The link of TCP/IP establishes between a personal digital assistant 20, and the junction server 40 and **.

[S4] A personal digital assistant 20 advances a data acquisition demand by the HTTP request on the virtual connection of TCP/IP.

[0029] In this case, in this invention, the index about the throughput and communication link condition of a personal digital assistant 20 is included in a data acquisition demand, and the data acquisition demand with an index is generated and it transmits. The case where an index is included in generation of the data acquisition demand with an index at URI (Universal Resource Identifier), the case where an index is included in a HTTP header, and *****. It mentions later for details.

[S5] The link of TCP/IP establishes between the junction server 40, a server 30, and **.

[S6] The junction server 40 sends a data acquisition demand to a server 30.

[S7] A server 30 transmits carrier beam data for a demand to ejection and the junction server 40 from database 30a using SQL which is database query language.

[S8] The link of TCP/IP cuts between the junction server 40, a server 30, and **.

[S9] The data-conversion means 41 of the junction server 40 changes data based on an index. And the junction server 40 writes the changed data in the disk on the junction server 40 (it corresponds to the data storage means 42.).

[0030] Thus, what is necessary is just to return changed data to a personal digital assistant 20, without newly accessing a server 30, when the data acquisition demand to which the index of the same condition

of end as a degree and the same communication link conditions was added by writing in and saving the data after conversion comes. In addition, since a personal digital assistant 20 has a PHS function, field strength etc. is indicated by the index as communication link conditions.

[S10] The junction server 40 transmits the data after conversion to a personal digital assistant 20.

[S11] The link of TCP/IP cuts between the junction server 40, and a personal digital assistant 20 and **.

[S12] The link of PPP cuts between a personal digital assistant 20, and an access point 53 and **.

[S13] The link of PIAFS cuts between a personal digital assistant 20, and an access point 53 and **.

[0031] As explained above, the network system 10 of this invention transmitted the data acquisition demand with an index, and after it changed the data acquired from the server 30 by the junction server 40 based on the index, it considered it as the configuration transmitted to a personal digital assistant 20.

[0032] Thereby, it becomes possible to mitigate the load of a server 30, the junction server 40, and a network. Next, generation of the data acquisition demand with an index is explained using [drawing 5](#) and [drawing 6](#). [Drawing 5](#) is drawing showing the data acquisition demand with an index at the time of including an index in URI.

[0033] The data acquisition demand C1 with an index at the time of including an index in URI has added index 1b after actual URI1a. The condition of data transmission information is specified by this index 1b. In addition, www.hoge.co.jp is the identifier of the server 30 of WWW.

[0034] [Drawing 6](#) is drawing showing the data acquisition demand with an index at the time of including an index in a HTTP header. The data acquisition demand C2 with an index has added index 2b in HTTP header 2a.

[0035] Thus, index 2b is embedded into a HTTP protocol using the escape of the header of HTTP. And the condition of data transmission information is specified with this index 2b. In addition, it is shown also to any of index 1a of [drawing 5](#), and index 2b of [drawing 6](#) that the capacity of a personal digital assistant 20 is low, and communication link quality is bad.

[0036] Therefore, since a personal digital assistant 20 is low communication link quality in a low throughput in case data conversion is carried out, it changes so that data may decrease if possible. If the data which should communicate are a color picture, specifically, it is possible to change color picture data into 16 monochrome gradation etc.

[0037] Next, the data transmission in the case where a condition of end and communication link conditions differ from the conditions at the time of communicating before is explained. [Drawing 7](#) is the sequence diagram showing the procedure of the data transmission in the case where a condition of end and communication link conditions differ from former conditions. In addition, it explains after PPP link establishment.

[S20] The link of TCP/IP establishes between a personal digital assistant 20, and the junction server 40 and **.

[S21] A personal digital assistant 20 advances the data acquisition demand with an index on the virtual connection of TCP/IP.

[S22] The junction server 40 reads the data of the stored origin, and changes data based on an index. And the junction server 40 writes the changed data in a disk.

[S23] The junction server 40 transmits the data after conversion to a personal digital assistant 20.

[S24] The link of TCP/IP cuts between the junction server 40, and a personal digital assistant 20 and **.

[0038] Thus, what is necessary is just to change the data beforehand stored in the junction server 40, when it is the same data acquisition demand and a condition of end and communication link conditions differ from former conditions. It enables this to mitigate the load of a server 30, and a network load.

[0039] Next, when the data in a server 30 are updated, the data transmission of an about is explained. Although premised on the case where there is no renewal of data by the server 30, in the sequence mentioned above, data are actually updated by the server 30, and also when the data stored in the junction server 40 are old, it thinks.

[0040] Therefore, the junction server 40 needs to get to know the data update information in a server 30, and it is necessary to perform updating control. In this case, last-modified in the header of the HTTP response returned from a server 30 A header is used. This last-modified The renewal time amount of last

of the data in a server 30 is indicated by the header.

[0041] In the junction server 40, this renewal time amount of last is stored in the file with data. And when the acquisition demand to the same data from a personal digital assistant 20 is next, in case a data acquisition demand is given to a server 30, it requires including this renewal time amount of last.

[0042] In this, it is if-modified-since in a HTTP request header. It will include in a header. When the carrier beam server 30 has updated data for the demand containing this header rather than that renewal time amount of last recently, "200O.K." is returned in the case of the response of HTTP, and data are returned as usual. Actuation of the subsequent junction server 40 is the same.

[0043] Moreover, if the renewal time amount of last has not changed, a server 30 returns "304not modified" by the response of HTTP, and does not return data. Therefore, this HTTP response will be changed, if the carrier beam junction server 40 can be judged that the data which he has are the newest and it is necessary to change it, and it returns to a personal digital assistant 20.

[0044] Drawing 8 is the sequence diagram showing the procedure of the data transmission accompanied by the updating control in the case where the data in a server 30 are not updated. In addition, it explains after TCP/IP link establishment.

[S30] A personal digital assistant 20 transmits the data acquisition demand with an index to the junction server 40.

[S31] In order to know whether the data in a server 30 were updated, the junction server 40 is required including the renewal time amount of last, in case a data acquisition demand is carried out.

[S32] Since the server 30 has not changed the renewal time amount of last, it transmits only a header to the junction server 40.

[S33] The junction server 40 gets to know that data are not updated, and reads the already stored data from the renewal time amount of last in a header.

[S34] The junction server 40 transmits data [finishing / conversion] to a personal digital assistant 20.

[0045] Drawing 9 is the sequence diagram showing the data transmission procedure accompanied by the updating control in the case where the data in a server 30 are updated. In addition, it explains after TCP/IP link establishment.

[S40] A personal digital assistant 20 transmits the data acquisition demand with an index to the junction server 40.

[S41] In order to know whether the data in a server 30 were updated, the junction server 40 is required including the renewal time amount of last, in case a data acquisition demand is carried out.

[S42] Since the server 30 has changed the renewal time amount of last, the data of the carrier beam newest are transmitted for a demand to the junction server 40 from database 30a also including ejection and the renewal time amount of last using SQL which is database query language.

[S43] The junction server 40 gets to know being updated from the renewal time amount of last, changes data based on an index, and writes them in a disk.

[S44] The junction server 40 transmits the data after conversion to a personal digital assistant 20.

[0046] Next, the case where data transmission is performed is explained based on the renewal time amount of last from a personal digital assistant 20. Although premised on the data transmission mentioned above acquiring data from a personal digital assistant 20 for the first time, there may already be information in a personal digital assistant 20 actually.

[0047] For example, it is a case so that the cache memory in a personal digital assistant 20 (the following, cache) may store information which is accessed frequently. last-modified sent from a server 30 also in this case It is carried out using a header. That is, when it already has data in the cache of a personal digital assistant 20, a personal digital assistant 20 acquires the renewal time amount of last (last-modified what was obtained from the field) from cache data.

[0048] And in case the data acquisition demand with an index is given to a server 30, it is if-modified-since to a header. The field is attached and the renewal time amount of last which acquired the point is added. The data is stored in the junction server 40, and if the junction server 40 which obtained this is newer than the renewal time amount of last, it will return the data to a personal digital assistant 20.

[0049] Moreover, if it is the same updating time amount, only the header of the status code of "304n not

modified" will be returned, without returning data. Furthermore, if the data in the junction server 40 are older than the data of a personal digital assistant 20, data will be acquired from a server 30. If it is not data suitable for the conditions of a personal digital assistant 20 in that case, transform processing will be performed based on an index.

[0050] Although drawing 10 has a cache in a personal digital assistant 20, it is the sequence diagram showing the procedure of data transmission when the data in a personal digital assistant 20 are old. In addition, it explains after TCP/IP link establishment.

[S50] A personal digital assistant 20 transmits the data acquisition demand with an index including the renewal time amount of last.

[S51] The junction server 40 gets to know that the data in a personal digital assistant 20 are older than the renewal time amount of last, and reads changed data.

[S52] The junction server 40 transmits the data after conversion to a personal digital assistant 20.

[0051] Drawing 11 is the sequence diagram in which a cache's being in a personal digital assistant 20, and showing the procedure of data transmission in case the data in a personal digital assistant 20 are the newest. In addition, it explains after TCP/IP link establishment.

[S60] A personal digital assistant 20 transmits the data acquisition demand with an index including the renewal time amount of last.

[S61] From the renewal time amount of last, the junction server 40 gets to know that the data in a personal digital assistant 20 are the newest, and transmits only a header.

[0052] Drawing 12 is the sequence diagram in which a cache's being in a personal digital assistant 20, and showing the procedure of data transmission when the data in a personal digital assistant 20 are newer than the data of the junction server 40. In addition, it explains after TCP/IP link establishment.

[S70] A personal digital assistant 20 transmits the data acquisition demand with an index including the renewal time amount of last. [S71] From the renewal time amount of last, the data in the junction server 40 require the junction server 40 including the renewal time amount of last, in case it gets to know that it is older than the data in a personal digital assistant 20 and a data acquisition demand is given to a server 30.

[S72] A server 30 transmits the data of the carrier beam newest for a demand to the junction server 40 from database 30a also including ejection and the renewal time amount of last using SQL which is database query language.

[S73] The junction server 40 changes the acquired newest data based on an index, and writes them in a disk.

[S74] The junction server 40 transmits the data after conversion to a personal digital assistant 20.

[0053] Next, data conversion is explained. Text data and GIF (Graphics Interchange Format) which were described in HTML here although there were various classes of the multimedia data acquired from a server 30 It is aimed at the image data to depend and the image data based on a JPEG format.

[0054] First, the case where data conversion is carried out is considered corresponding to the data processing capacity of HTML of a personal digital assistant 20. Much amelioration has put current on the format of HTML.

[0055] For this reason, when the viewer of a personal digital assistant 20 can respond only to old HTML and is not, the data of a new HTML format cannot be interpreted. Drawing 13 is drawing showing the data acquisition demand with an index. It is shown that the viewer 100 supports the version 1.0 of HTML as a throughput of a personal digital assistant 20, and this data acquisition demand with an index is transmitted.

[0056] Drawing 14 is drawing showing HTML which the junction server 40 acquired from the server 30. The viewer 101 shows HTML which the junction server 40 acquired from the server 30 based on the data acquisition demand from a personal digital assistant 20.

[0057] Drawing 15 is drawing showing HTML after data conversion. The viewer 102 shows HTML after data conversion, and this HTML is displayed on a personal digital assistant 20. That is, since data-division part 101a of drawing 14 is a format of the version 3.2 of the HTML <FRAMESET>, in the viewer which a personal digital assistant 20 has, it cannot be interpreted but can interpret <BODY> or

subsequent ones.

[0058] Therefore, in the junction server 40, data-division part 101a which cannot be interpreted is deleted, and it changes into data like drawing 15, and transmits to a personal digital assistant 20. Next, conversion in case data are an image file is explained. There are various things, such as a color, black and white, high degree of accuracy, low precision, high quality, and low quality, in an image file, and the number of pixels is also various.

[0059] For example, by black and white, when there is little memory, even if a personal digital assistant 20 acquires the data of high degree of accuracy and high quality in a color, it cannot see. Moreover, a vast image cannot be seen in the personal digital assistant 20 to which the magnitude which can be displayed was restricted. If it is going to transmit big image data when a communication link condition is still worse, acquisition of data will go wrong on the way, or data transmission will take time amount.

[0060] Drawing 16 is drawing showing the translation table of an image file. The conversion approach at the time of changing into a table 110 appropriately according to the situation of a personal digital assistant 20 and a communication link condition is indicated.

[0061] For example, if an object format is GIF when a personal digital assistant 20 is the throughput of monochrome display, it is grayscale about a color picture. It changes into one gradation of 2, 4, 8, and 16.

[0062] In addition, although GIF and JPEG are possible for the change in image size and GIF can specify the color number for them, JPEG cannot specify the color number. Moreover, in JPEG, although image quality can be specified, GIF is not made.

[0063] As explained above, the network system 10 of this invention was considered as the configuration which changes and acquires data by the junction server 40 in consideration of the condition of the communication network 50 between the client terminal 20 and the junction server 40, or the own throughput of a terminal at the time of acquisition of data.

[0064] By this, the amount of data is reduced, and redundant data can be reduced, and the effectiveness that data transmission can be performed efficiently is acquired. Furthermore, because a changed file is accessed, since it becomes to the acquisition demand of the 2nd henceforth by storing data after data conversion by the junction server 40 in the case of a data acquisition demand, it becomes possible to mitigate the load of the junction server 40, and the load of a server 30.

[0065]

[Effect of the Invention] As explained above, in case a client terminal acquired data from a server, the index about data transmission information was added to the data acquisition demand, and it transmitted, and after the network system of this invention changed the data acquired from the server by the junction server based on the index, it was considered as the configuration transmitted to a client terminal.

Thereby, since a server and the data which suited conditions, such as a communication link condition of a communication network and a self throughput, between client terminals can be transmitted and received, efficient data transmission becomes possible.

[0066] Moreover, when the client terminal of this invention acquired data from a server, it was considered as the configuration which adds the index about data transmission information to a data acquisition demand, and is transmitted. Thereby, since conditions, such as a communication link condition of a communication network and a self throughput, can be notified to an information offer side, efficient data transmission becomes possible.

[0067] Furthermore, after the junction server of this invention changed the data acquired from the server based on the index, it was taken as the configuration transmitted to a client terminal. Since the data suitable for conditions, such as a communication link condition of a communication network and a self throughput, can be transmitted to a client terminal by this, efficient data transmission becomes possible.

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TECHNICAL FIELD

[Field of the Invention] Especially this invention relates to the server which the network system which performs data transmission in the network of a client-server mold, and the client terminal which acquires data from the server which performs information offer are performed, and performs information offer, and the junction server which performs junction control with the client terminal which acquires data from a server about a network system, a client terminal, and a junction server.

[Translation done.]

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PRIOR ART

[Description of the Prior Art] In recent years, the opportunity of the multimedia communication which communicates combining a text, an image, voice, etc. integrative has been growing quickly with an advance of a network technique.

[0003] In multimedia communication, in case other terminals on a network are provided with various services, the information offer server is used. An information offer server transmits various multimedia data, such as text data, image data, and voice data, to a partner terminal.

[0004] Drawing 17 is drawing showing the data transmission configuration of an information offer server and a terminal. It connects with a communication network 50 using an attached communication network interface (not shown), and the information offer server 300 connects a terminal 200 with a communication network 50 through the gateway 400. And a communication link is performed between a terminal 200 and the information offer server 300.

[0005] In case a terminal 200 downloads data from the information offer server 300, a connection physical between a terminal 200 and the information offer server 300 or imagination is established. And a data acquisition demand is made from a terminal 200 on this connection, and that data is transmitted from the information offer server 300.

[0006] In this case, the name of the data which the information offer server 300 has is specified as the data acquisition demand from the terminal 200, and the information offer server 300 which obtained this transmits the data which are in agreement with the name of data to a terminal 200. Then, a connection is cut or an acquisition demand to other data is made again.

[Translation done.]

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EFFECT OF THE INVENTION

[Effect of the Invention] As explained above, in case a client terminal acquired data from a server, the index about data transmission information was added to the data acquisition demand, and it transmitted, and after the network system of this invention changed the data acquired from the server by the junction server based on the index, it was considered as the configuration transmitted to a client terminal.

Thereby, since a server and the data which suited conditions, such as a communication link condition of a communication network and a self throughput, between client terminals can be transmitted and received, efficient data transmission becomes possible.

[0066] Moreover, when the client terminal of this invention acquired data from a server, it was considered as the configuration which adds the index about data transmission information to a data acquisition demand, and is transmitted. Thereby, since conditions, such as a communication link condition of a communication network and a self throughput, can be notified to an information offer side, efficient data transmission becomes possible.

[0067] Furthermore, after the junction server of this invention changed the data acquired from the server based on the index, it was taken as the configuration transmitted to a client terminal. Since the data suitable for conditions, such as a communication link condition of a communication network and a self throughput, can be transmitted to a client terminal by this, efficient data transmission becomes possible.

[Translation done.]

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, in the above conventional data transmission, the information offer server 300 was transmitting the data stored regardless of the condition of a communication network 50. For this reason, even when the transmission capacity of a communication network 50 is low, the data of a large quantity will be sent, for example, and there was a problem that that a terminal 200 acquires data took time amount.

[0008] Moreover, the information offer server 300 was transmitting the stored data as it was, without taking the classification and the throughput of a partner terminal into consideration. For this reason, there was only no memory which stores data in a terminal 200, and the indicative data exceeding the capacity which can display a terminal 200 was transmitted and carried out, and there were problems, such as relaxation.

[0009] It aims at offering the network system which this invention is made in view of such a point, performs data conversion according to conditions, such as a communication link condition and a throughput of a terminal, and performs data transmission efficiently.

[0010] Moreover, other objects of this invention add conditions, such as a communication link condition and a throughput of a terminal, to data, transmit, and are to offer the client terminal which performs data transmission efficiently.

[0011] Furthermore, other objects of this invention are to offer the junction server which performs data conversion according to conditions, such as a communication link condition and a throughput of a terminal, and performs data transmission efficiently.

[Translation done.]

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MEANS

[Means for Solving the Problem] In the network system which performs data transmission in the network of a client-server mold in order to solve the above-mentioned technical problem in this invention In case data are acquired from the server which performs information offer, and said server, the index about data transmission information is added to a data acquisition demand. A client terminal including a data acquisition demand transmitting means with an index to generate the data acquisition demand with an index and to transmit, A data-conversion means to change said data acquired from said server based on said index, a data storage means to store the data after conversion -- since -- it is constituted and the network system characterized by having the junction server which performs junction control with said server and said client terminal is offered.

[0013] Here, in case it acquires data from a server, the data acquisition demand transmitting means with an index adds the index about data transmission information to a data acquisition demand, generates the data acquisition demand with an index, and transmits it. A data-conversion means changes the data acquired from the server based on an index. A data storage means stores the data after conversion.

[0014]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained with reference to a drawing. Drawing 1 is principle drawing of the network system of this invention. A network system 10 takes the network configuration of a client-server mold, and performs data transmission through a communication network 50.

[0015] moreover, the junction server 40 which performs junction control with the server 30 to which a network system 10 performs information offer, the client terminal 20 which acquires data from a server 30, and a server 30 and the client terminal 20 -- since -- it is constituted.

[0016] In case the client terminal 20 acquires data from a server 30, the data acquisition demand transmitting means 21 with an index adds the index about data transmission information to a data acquisition demand, generates the data acquisition demand C with an index, and transmits it.

[0017] Data transmission information means the communication link condition of a communication network 50, the throughput of client terminal 20 self, etc. here. The junction server 40 transmits this data acquisition demand C with an index to a server 30, and acquires the corresponding data D1 from a server 30.

[0018] The data-conversion means 41 changes the data D1 acquired from the server 30 based on an index, and the data storage means 42 stores the data D2 after conversion. Then, the junction server 40 transmits the data D2 after conversion to the client terminal 20.

[0019] In addition, the junction control which the junction server 40 performs means the transmission control of being as transmitting data, without changing without the need for conversion **** [and], to the client terminal 20 and the data which are transmitted and received between servers 30. [changing based on an index]

[0020] Next, the concrete configuration of the network system 10 of this invention is explained. Drawing 2 is drawing showing the configuration of a network system 10. The client terminal 20 (it is hereafter called a personal digital assistant 20.) of this invention shall have a PHS function here.

Moreover, a personal digital assistant 20 and a server 30 shall perform data transmission on the Internet.

[0021] A personal digital assistant 20 radiocommunicates through a base station 51. A base station 51 is connected with the ISDN network 52. The ISDN network 52 and LAN54 are connected through the access point 53 used as reception opening at the time of accessing mutually.

[0022] The junction server 40 which performs junction control with a personal digital assistant 20 and a server 30, the server 30 which has database 30a, and ** connect with LAN54. Next, the protocol stack in the data transmission in a network system 10 is explained. Drawing 3 is drawing showing a protocol stack.

[0023] The layer configuration of a personal digital assistant 20 consists of high orders HTTP (Hyper Text Transfer Protocol), TCP/IP, and PPP, PIAFS and STD28. The layer configuration by the side of the personal digital assistant 20 of a base station 51 consists of high orders HTTP, TCP/IP, and PPP, PIAFS and STD28. Moreover, the layer configuration by the side of the ISDN network 52 of a base station 51 is constituted from a high order by HTTP, TCP/IP, and PPP, PIAFS and ISDN.

[0024] The layer configuration by the side of the ISDN network 52 of an access point 53 is constituted from a high order by HTTP, TCP/IP, and PPP, PIAFS and ISDN. The layer configuration by the side of LAN54 of an access point 53 is constituted from a high order by HTTP, TCP/IP, MAC, and physics.

[0025] The layer configuration of the junction server 40 consists of HTTP, TCP/IP, MAC, and physics. The layer configuration of a server 30 consists of HTTP, TCP/IP, MAC, and physics.

[0026] Thus, in a high order layer, it is HTML (Hyper Text Markup Language). TCP/IP is used by the layer under it using the protocol HTTP for exchanging a hypertext. And in the layer not more than this, protocol conversion is suitably performed by each equipment using the protocol for doubling with each equipment.

[0027] First, between a personal digital assistant 20 and an access point 53, PPP is used at the time of data transmission, and the connection of 1 to 1 is decided at it. Furthermore, PIAFS is used between the personal digital assistant 20 and the access point 53 in this case. between the terminal which supports the transmission system of PHS with PIAFS, and a terminal -- an error -- it is a transmission system for performing free transmission.

[0028] Here, the error free-lancer in the wireless section of PHS shall be guaranteed in an access point 53, and data shall be poured to LAN54. Next, detail actuation of a network system 10 is explained.

Drawing 4 is the sequence diagram showing the procedure at the time of letting the junction server 40 pass and performing data conversion.

[S1] The link of PIAFS establishes between a personal digital assistant 20, and an access point 53 and **.

[S2] The link of PPP establishes on the link of PIAFS. Thereby, a personal digital assistant 20 and a server 30 are physically connected through an access point 53.

[S3] The link of TCP/IP establishes between a personal digital assistant 20, and the junction server 40 and **.

[S4] A personal digital assistant 20 advances a data acquisition demand by the HTTP request on the virtual connection of TCP/IP.

[0029] In this case, in this invention, the index about the throughput and communication link condition of a personal digital assistant 20 is included in a data acquisition demand, and the data acquisition demand with an index is generated and it transmits. The case where an index is included in generation of the data acquisition demand with an index at URI (Universal Resource Identifier), the case where an index is included in a HTTP header, and *****. It mentions later for details.

[S5] The link of TCP/IP establishes between the junction server 40, a server 30, and **.

[S6] The junction server 40 sends a data acquisition demand to a server 30.

[S7] A server 30 transmits carrier beam data for a demand to ejection and the junction server 40 from database 30a using SQL which is database query language.

[S8] The link of TCP/IP cuts between the junction server 40, a server 30, and **.

[S9] The data-conversion means 41 of the junction server 40 changes data based on an index. And the junction server 40 writes the changed data in the disk on the junction server 40 (it corresponds to the

data storage means 42.).

[0030] Thus, what is necessary is just to return changed data to a personal digital assistant 20, without newly accessing a server 30, when the data acquisition demand to which the index of the same condition of end as a degree and the same communication link conditions was added by writing in and saving the data after conversion comes. In addition, since a personal digital assistant 20 has a PHS function, field strength etc. is indicated by the index as communication link conditions.

[S10] The junction server 40 transmits the data after conversion to a personal digital assistant 20.

[S11] The link of TCP/IP cuts between the junction server 40, and a personal digital assistant 20 and **.

[S12] The link of PPP cuts between a personal digital assistant 20, and an access point 53 and **.

[S13] The link of PIAFS cuts between a personal digital assistant 20, and an access point 53 and **.

[0031] As explained above, the network system 10 of this invention transmitted the data acquisition demand with an index, and after it changed the data acquired from the server 30 by the junction server 40 based on the index, it considered it as the configuration transmitted to a personal digital assistant 20.

[0032] Thereby, it becomes possible to mitigate the load of a server 30, the junction server 40, and a network. Next, generation of the data acquisition demand with an index is explained using drawing 5 and drawing 6. Drawing 5 is drawing showing the data acquisition demand with an index at the time of including an index in URI.

[0033] The data acquisition demand C1 with an index at the time of including an index in URI has added index 1b after actual URI1a. The condition of data transmission information is specified by this index 1b. In addition, www.hoge.co.jp is the identifier of the server 30 of WWW.

[0034] Drawing 6 is drawing showing the data acquisition demand with an index at the time of including an index in a HTTP header. The data acquisition demand C2 with an index has added index 2b in HTTP header 2a.

[0035] Thus, index 2b is embedded into a HTTP protocol using the escape of the header of HTTP. And the condition of data transmission information is specified with this index 2b. In addition, it is shown also to any of index 1a of drawing 5, and index 2b of drawing 6 that the capacity of a personal digital assistant 20 is low, and communication link quality is bad.

[0036] Therefore, since a personal digital assistant 20 is low communication link quality in a low throughput in case data conversion is carried out, it changes so that data may decrease if possible. If the data which should communicate are a color picture, specifically, it is possible to change color picture data into 16 monochrome gradation etc.

[0037] Next, the data transmission in the case where a condition of end and communication link conditions differ from the conditions at the time of communicating before is explained. Drawing 7 is the sequence diagram showing the procedure of the data transmission in the case where a condition of end and communication link conditions differ from former conditions. In addition, it explains after PPP link establishment.

[S20] The link of TCP/IP establishes between a personal digital assistant 20, and the junction server 40 and **.

[S21] A personal digital assistant 20 advances the data acquisition demand with an index on the virtual connection of TCP/IP.

[S22] The junction server 40 reads the data of the stored origin, and changes data based on an index. And the junction server 40 writes the changed data in a disk.

[S23] The junction server 40 transmits the data after conversion to a personal digital assistant 20.

[S24] The link of TCP/IP cuts between the junction server 40, and a personal digital assistant 20 and **.

[0038] Thus, what is necessary is just to change the data beforehand stored in the junction server 40, when it is the same data acquisition demand and a condition of end and communication link conditions differ from former conditions. It enables this to mitigate the load of a server 30, and a network load.

[0039] Next, when the data in a server 30 are updated, the data transmission of an about is explained. Although premised on the case where there is no renewal of data by the server 30, in the sequence mentioned above, data are actually updated by the server 30, and also when the data stored in the junction server 40 are old, it thinks.

[0040] Therefore, the junction server 40 needs to get to know the data update information in a server 30, and it is necessary to perform updating control. In this case, last-modified in the header of the HTTP response returned from a server 30 A header is used. This last-modified The renewal time amount of last of the data in a server 30 is indicated by the header.

[0041] In the junction server 40, this renewal time amount of last is stored in the file with data. And when the acquisition demand to the same data from a personal digital assistant 20 is next, in case a data acquisition demand is given to a server 30, it requires including this renewal time amount of last.

[0042] In this, it is if-modified-since in a HTTP request header. It will include in a header. When the carrier beam server 30 has updated data for the demand containing this header rather than that renewal time amount of last recently, "200O.K." is returned in the case of the response of HTTP, and data are returned as usual. Actuation of the subsequent junction server 40 is the same.

[0043] Moreover, if the renewal time amount of last has not changed, a server 30 returns "304not modified" by the response of HTTP, and does not return data. Therefore, this HTTP response will be changed, if the carrier beam junction server 40 can be judged that the data which he has are the newest and it is necessary to change it, and it returns to a personal digital assistant 20.

[0044] Drawing 8 is the sequence diagram showing the procedure of the data transmission accompanied by the updating control in the case where the data in a server 30 are not updated. In addition, it explains after TCP/IP link establishment.

[S30] A personal digital assistant 20 transmits the data acquisition demand with an index to the junction server 40.

[S31] In order to know whether the data in a server 30 were updated, the junction server 40 is required including the renewal time amount of last, in case a data acquisition demand is carried out.

[S32] Since the server 30 has not changed the renewal time amount of last, it transmits only a header to the junction server 40.

[S33] The junction server 40 gets to know that data are not updated, and reads the already stored data from the renewal time amount of last in a header.

[S34] The junction server 40 transmits data [finishing / conversion] to a personal digital assistant 20.

[0045] Drawing 9 is the sequence diagram showing the data transmission procedure accompanied by the updating control in the case where the data in a server 30 are updated. In addition, it explains after TCP/IP link establishment.

[S40] A personal digital assistant 20 transmits the data acquisition demand with an index to the junction server 40.

[S41] In order to know whether the data in a server 30 were updated, the junction server 40 is required including the renewal time amount of last, in case a data acquisition demand is carried out.

[S42] Since the server 30 has changed the renewal time amount of last, the data of the carrier beam newest are transmitted for a demand to the junction server 40 from database 30a also including ejection and the renewal time amount of last using SQL which is database query language.

[S43] The junction server 40 gets to know being updated from the renewal time amount of last, changes data based on an index, and writes them in a disk.

[S44] The junction server 40 transmits the data after conversion to a personal digital assistant 20.

[0046] Next, the case where data transmission is performed is explained based on the renewal time amount of last from a personal digital assistant 20. Although premised on the data transmission mentioned above acquiring data from a personal digital assistant 20 for the first time, there may already be information in a personal digital assistant 20 actually.

[0047] For example, it is a case so that the cache memory in a personal digital assistant 20 (the following, cache) may store information which is accessed frequently. last-modified sent from a server 30 also in this case It is carried out using a header. That is, when it already has data in the cache of a personal digital assistant 20, a personal digital assistant 20 acquires the renewal time amount of last (last-modified what was obtained from the field) from cache data.

[0048] And in case the data acquisition demand with an index is given to a server 30, it is if-modified-since to a header. The field is attached and the renewal time amount of last which acquired the point is

added. The data is stored in the junction server 40, and if the junction server 40 which obtained this is newer than the renewal time amount of last, it will return the data to a personal digital assistant 20. [0049] Moreover, if it is the same updating time amount, only the header of the status code of "304n not modified" will be returned, without returning data. Furthermore, if the data in the junction server 40 are older than the data of a personal digital assistant 20, data will be acquired from a server 30. If it is not data suitable for the conditions of a personal digital assistant 20 in that case, transform processing will be performed based on an index.

[0050] Although drawing 10 has a cache in a personal digital assistant 20, it is the sequence diagram showing the procedure of data transmission when the data in a personal digital assistant 20 are old. In addition, it explains after TCP/IP link establishment.

[S50] A personal digital assistant 20 transmits the data acquisition demand with an index including the renewal time amount of last.

[S51] The junction server 40 gets to know that the data in a personal digital assistant 20 are older than the renewal time amount of last, and reads changed data.

[S52] The junction server 40 transmits the data after conversion to a personal digital assistant 20.

[0051] Drawing 11 is the sequence diagram in which a cache's being in a personal digital assistant 20, and showing the procedure of data transmission in case the data in a personal digital assistant 20 are the newest. In addition, it explains after TCP/IP link establishment.

[S60] A personal digital assistant 20 transmits the data acquisition demand with an index including the renewal time amount of last.

[S61] From the renewal time amount of last, the junction server 40 gets to know that the data in a personal digital assistant 20 are the newest, and transmits only a header.

[0052] Drawing 12 is the sequence diagram in which a cache's being in a personal digital assistant 20, and showing the procedure of data transmission when the data in a personal digital assistant 20 are newer than the data of the junction server 40. In addition, it explains after TCP/IP link establishment.

[S70] A personal digital assistant 20 transmits the data acquisition demand with an index including the renewal time amount of last.

[S71] From the renewal time amount of last, the data in the junction server 40 require the junction server 40 including the renewal time amount of last, in case it gets to know that it is older than the data in a personal digital assistant 20 and a data acquisition demand is given to a server 30.

[S72] A server 30 transmits the data of the carrier beam newest for a demand to the junction server 40 from database 30a also including ejection and the renewal time amount of last using SQL which is database query language.

[S73] The junction server 40 changes the acquired newest data based on an index, and writes them in a disk.

[S74] The junction server 40 transmits the data after conversion to a personal digital assistant 20.

[0053] Next, data conversion is explained. Text data and GIF (Graphics Interchange Format) which were described in HTML here although there were various classes of the multimedia data acquired from a server 30 It is aimed at the image data to depend and the image data based on a JPEG format.

[0054] First, the case where data conversion is carried out is considered corresponding to the data processing capacity of HTML of a personal digital assistant 20. Much amelioration has put current on the format of HTML.

[0055] For this reason, when the viewer of a personal digital assistant 20 can respond only to old HTML and is not, the data of a new HTML format cannot be interpreted. Drawing 13 is drawing showing the data acquisition demand with an index. It is shown that the viewer 100 supports the version 1.0 of HTML as a throughput of a personal digital assistant 20, and this data acquisition demand with an index is transmitted.

[0056] Drawing 14 is drawing showing HTML which the junction server 40 acquired from the server 30. The viewer 101 shows HTML which the junction server 40 acquired from the server 30 based on the data acquisition demand from a personal digital assistant 20.

[0057] Drawing 15 is drawing showing HTML after data conversion. The viewer 102 shows HTML

after data conversion, and this HTML is displayed on a personal digital assistant 20. That is, since data-division part 101a of drawing 14 is a format of the version 3.2 of the HTML <FRAMESET>, in the viewer which a personal digital assistant 20 has, it cannot be interpreted but can interpret <BODY> or subsequent ones.

[0058] Therefore, in the junction server 40, data-division part 101a which cannot be interpreted is deleted, and it changes into data like drawing 15, and transmits to a personal digital assistant 20. Next, conversion in case data are an image file is explained. There are various things, such as a color, black and white, high degree of accuracy, low precision, high quality, and low quality, in an image file, and the number of pixels is also various.

[0059] For example, by black and white, when there is little memory, even if a personal digital assistant 20 acquires the data of high degree of accuracy and high quality in a color, it cannot see. Moreover, a vast image cannot be seen in the personal digital assistant 20 to which the magnitude which can be displayed was restricted. If it is going to transmit big image data when a communication link condition is still worse, acquisition of data will go wrong on the way, or data transmission will take time amount.

[0060] Drawing 16 is drawing showing the translation table of an image file. The conversion approach at the time of changing into a table 110 appropriately according to the situation of a personal digital assistant 20 and a communication link condition is indicated.

[0061] For example, if an object format is GIF when a personal digital assistant 20 is the throughput of monochrome display, it is grayscale about a color picture. It changes into one gradation of 2, 4, 8, and 16.

[0062] In addition, although GIF and JPEG are possible for the change in image size and GIF can specify the color number for them, JPEG cannot specify the color number. Moreover, in JPEG, although image quality can be specified, GIF is not made.

[0063] As explained above, the network system 10 of this invention was considered as the configuration which changes and acquires data by the junction server 40 in consideration of the condition of the communication network 50 between the client terminal 20 and the junction server 40, or the own throughput of a terminal at the time of acquisition of data.

[0064] By this, the amount of data is reduced, and redundant data can be reduced, and the effectiveness that data transmission can be performed efficiently is acquired. Furthermore, because a changed file is accessed, since it becomes to the acquisition demand of the 2nd henceforth by storing data after data conversion by the junction server 40 in the case of a data acquisition demand, it becomes possible to mitigate the load of the junction server 40, and the load of a server 30.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is principle drawing of the network system of this invention.

[Drawing 2] It is drawing showing the configuration of a network system.

[Drawing 3] It is drawing showing a protocol stack.

[Drawing 4] It is the sequence diagram showing the procedure at the time of letting a junction server pass and performing data conversion.

[Drawing 5] It is drawing showing the data acquisition demand with an index at the time of including an index in URI.

[Drawing 6] It is drawing showing the data acquisition demand with an index at the time of including an index in a HTTP header.

[Drawing 7] It is the sequence diagram showing the procedure of the data transmission in the case where a condition of end and communication link conditions differ from former conditions.

[Drawing 8] It is the sequence diagram showing the procedure of the data transmission accompanied by the updating control in the case where the data in a server are not updated.

[Drawing 9] It is the sequence diagram showing the data transmission procedure accompanied by the updating control in the case where the data in a server are updated.

[Drawing 10] Although a cache is in a personal digital assistant, it is the sequence diagram showing the procedure of data transmission when the data in a personal digital assistant are old.

[Drawing 11] It is the sequence diagram in which a cache's being in a personal digital assistant and showing the procedure of data transmission in case the data in a personal digital assistant are the newest.

[Drawing 12] It is the sequence diagram in which a cache's being in a personal digital assistant and showing the procedure of data transmission when the data in a personal digital assistant are newer than the data of a junction server.

[Drawing 13] It is drawing showing the data acquisition demand with an index.

[Drawing 14] A junction server is drawing showing HTML acquired from the server.

[Drawing 15] It is drawing showing HTML after data conversion.

[Drawing 16] It is drawing showing the translation table of an image file.

[Drawing 17] It is drawing showing the data transmission configuration of an information offer server and a terminal.

[Description of Notations]

10 [.. A server, 40 / .. A junction server, 41 / .. A data-conversion means, 42 / .. A data storage means, C / .. The data acquisition demand with an index, D1 / .. Data, D2 / .. Data after conversion.] A network system, 20 .. A client terminal, 21 .. A data acquisition demand transmitting means with an index, 30

[Translation done.]

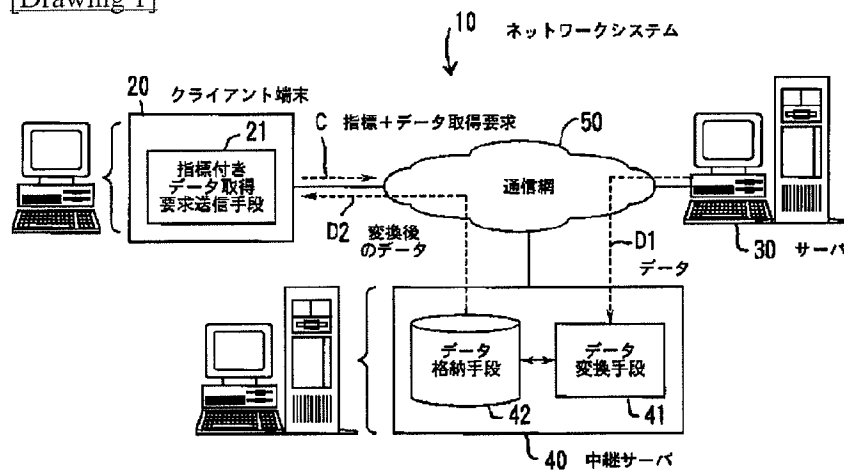
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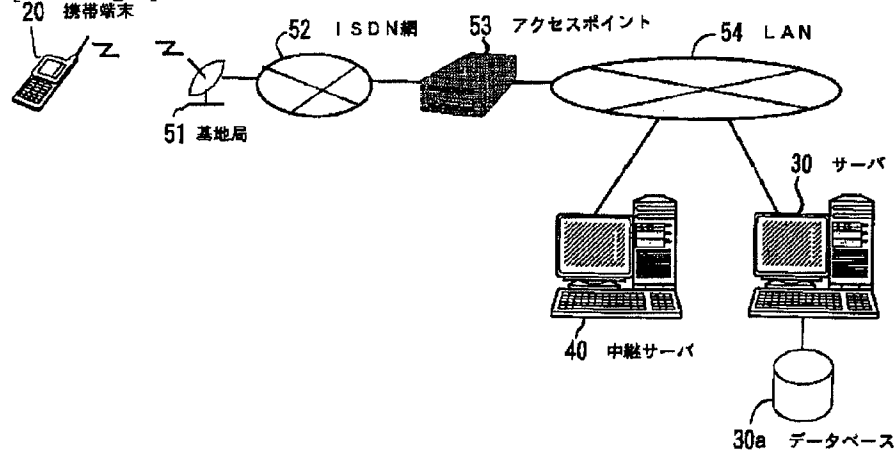
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DRAWINGS

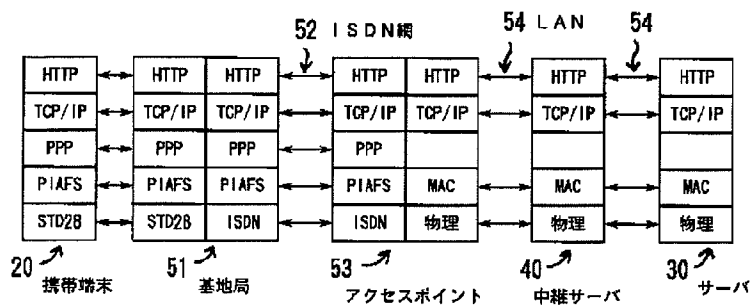
[Drawing 1]



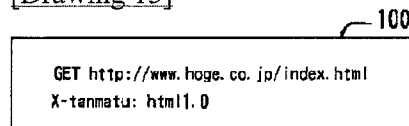
[Drawing 2]



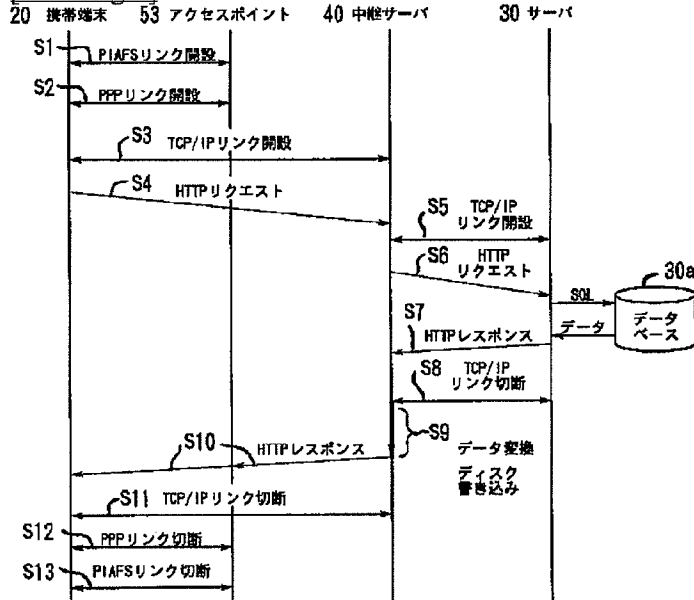
[Drawing 3]



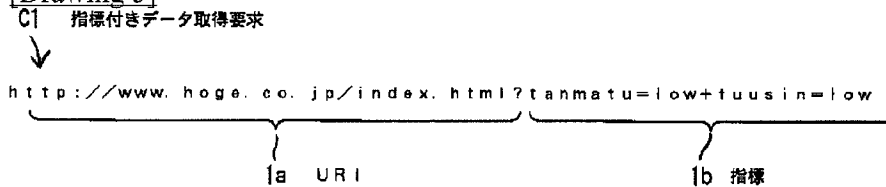
[Drawing 13]



[Drawing 4]



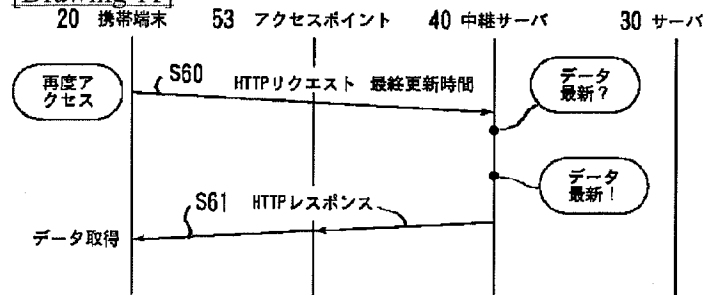
[Drawing 5]



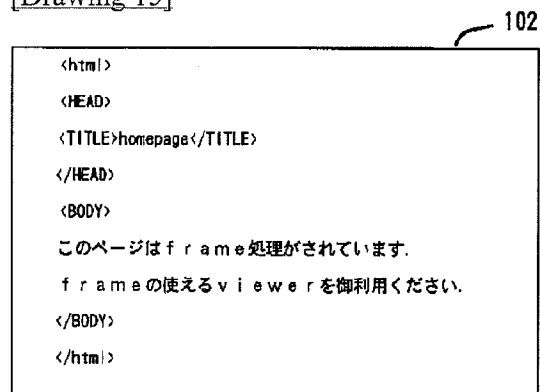
[Drawing 6]



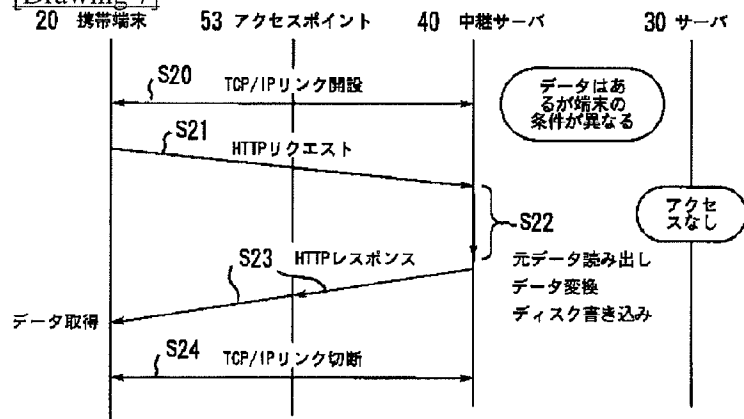
[Drawing 11]



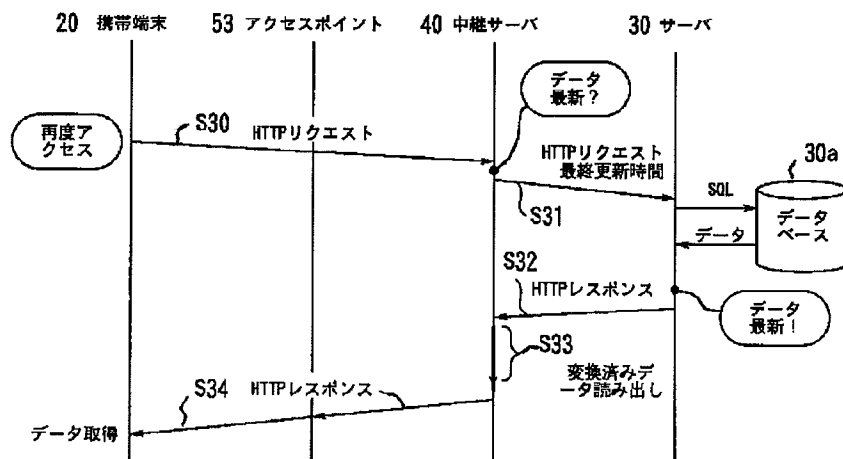
[Drawing 15]



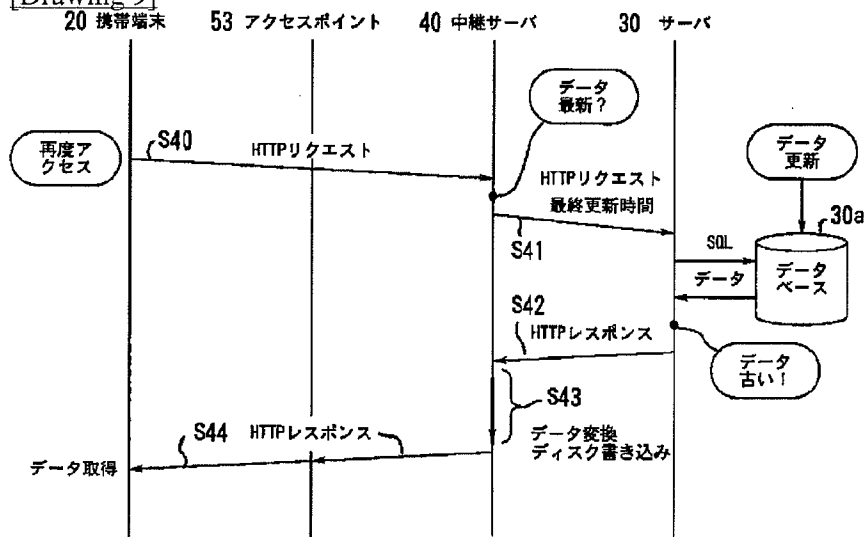
[Drawing 7]



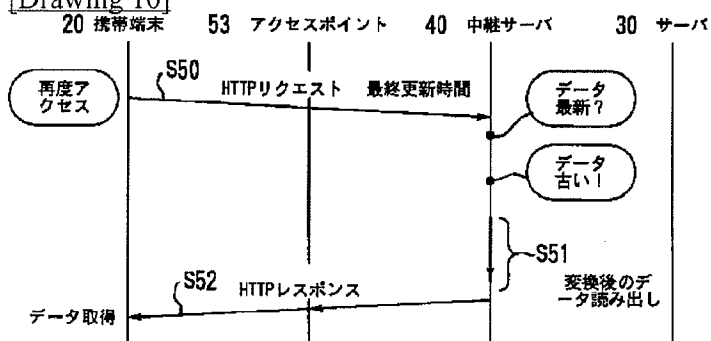
[Drawing 8]



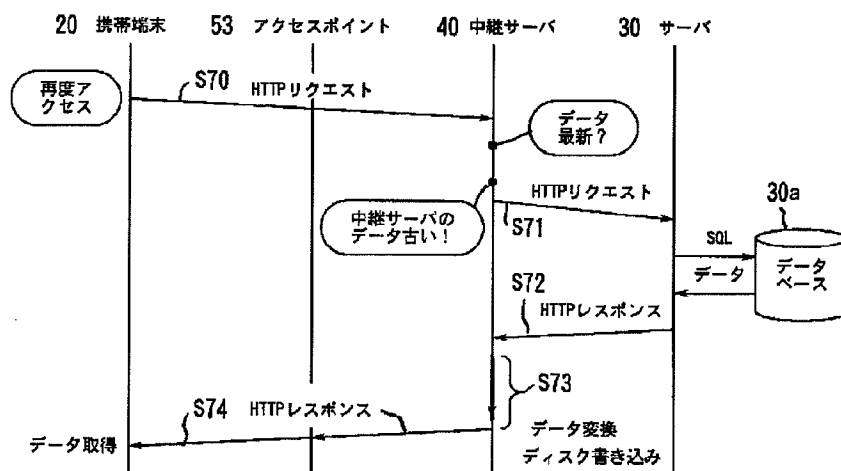
[Drawing 9]



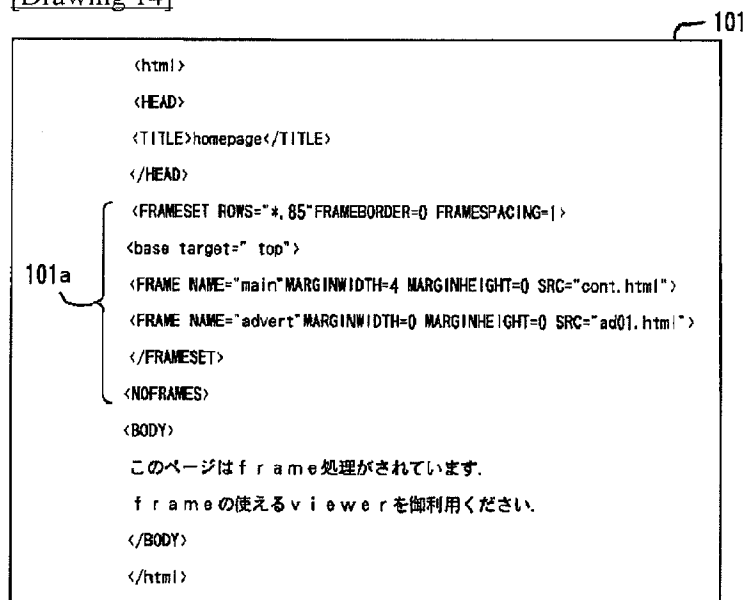
[Drawing 10]



[Drawing 12]



[Drawing 14]

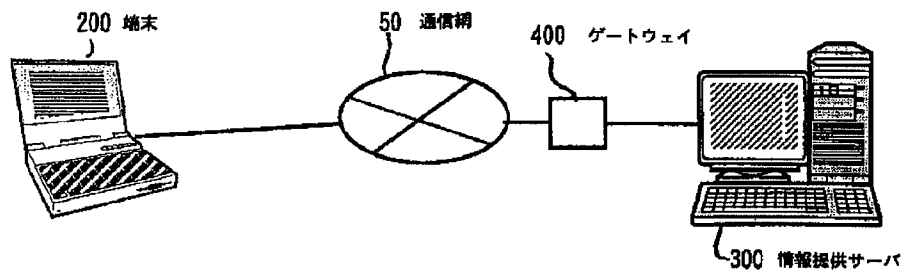


[Drawing 16]

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端末	通信	変換方法	対象画像フォーマット
白黒	—	grayscale 2、4、8、16階調	G I F
白黒	—	grayscale	J P E G
メモリ小	—	画像サイズ縮小	G I F、J P E G
—	低品質	画像サイズ縮小	G I F、J P E G
—	低品質	画像品質低下	J P E G

[Drawing 17]



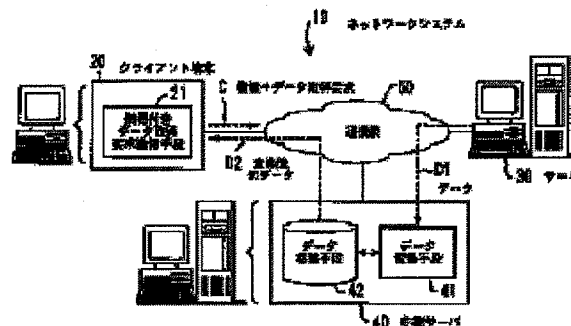
[Translation done.]

NETWORK SYSTEM, CLIENT TERMINAL AND RELAY SERVER**Publication number:** JP11149448**Publication date:** 1999-06-02**Inventor:** HIDAKA ISAO**Applicant:** SONY CORP**Classification:****- international:** G06F12/00; G06F13/00; G06F15/00; G06F12/00; G06F13/00; G06F15/00; (IPC1-7): G06F15/00; G06F12/00; G06F13/00**- european:****Application number:** JP19970316673 19971118**Priority number(s):** JP19970316673 19971118

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Abstract of JP11149448

PROBLEM TO BE SOLVED: To provide a network system with which data are efficiently transmitted by converting data corresponding to conditions such as a communication state or the throughput of a terminal. **SOLUTION:** When acquiring data D1 from a server 30, a data-with-index acquisition request transmitting means 21 generates and transmits a data acquisition request C with index by adding an index concerning data transmission information to the data acquisition request. A data converting means 41 converts the data D1 acquired from the server 30, based on the index. A data storage means 42 stores converted data D2.



Data supplied from the esp@cenet database - Worldwide

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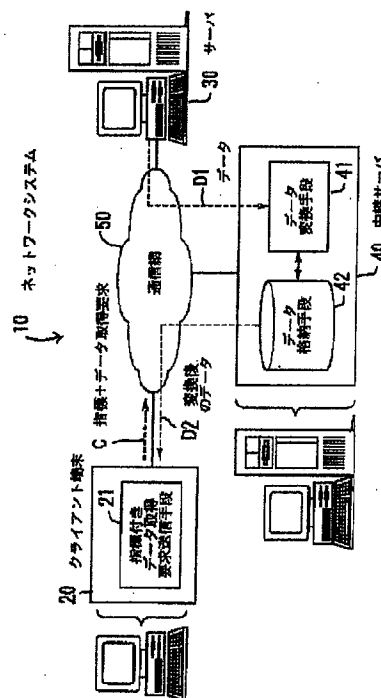
東京都品川区北品川6丁目7番35号 ソニー株式会社内

(54) 【発明の名称】 ネットワークシステム、クライアント端末及び中継サーバ

(57) 【要約】

【課題】 通信状態や端末の処理能力などの条件に応じてデータ変換を行って、効率よくデータ伝送を行うネットワークシステムを提供することを目的とする。

【解決手段】 指標付きデータ取得要求送信手段21は、サーバ30からデータD1を取得する際に、データ伝送情報に関する指標をデータ取得要求に付加し、指標付きデータ取得要求Cを生成して送信する。データ変換手段41は、サーバ30から取得したデータD1を指標にもとづいて変換する。データ格納手段42は、変換後のデータD2を格納する。



【特許請求の範囲】

【請求項1】 クライアントサーバ型のネットワークでデータ伝送を行うネットワークシステムにおいて、情報提供を行うサーバと、

前記サーバからデータを取得する際に、データ伝送情報に関する指標をデータ取得要求に付加し、指標付きデータ取得要求を生成して送信する指標付きデータ取得要求送信手段を含むクライアント端末と、

前記サーバから取得した前記データを前記指標にもとづいて変換するデータ変換手段と、変換後のデータを格納するデータ格納手段と、から構成され、前記サーバと前記クライアント端末との中継制御を行う中継サーバと、を有することを特徴とするネットワークシステム。

【請求項2】 前記指標付きデータ取得要求送信手段は、通信網の通信状態及び自己の処理能力を前記データ伝送情報とすることを特徴とする請求項1記載のネットワークシステム。

【請求項3】 前記クライアント端末は、携帯電話機能を有し、電界強度を前記通信網の通信状態に関する前記指標とすることを特徴とする請求項2記載のネットワークシステム。

【請求項4】 前記ネットワークシステムは、HTTPプロトコルを用いて、前記データ伝送を行うことを特徴とする請求項1記載のネットワークシステム。

【請求項5】 前記指標付きデータ取得要求送信手段は、前記データがHTMLの場合は、前記HTMLの版数を前記指標とすることを特徴とする請求項4記載のネットワークシステム。

【請求項6】 前記指標付きデータ取得要求送信手段は、前記データが画像ファイルの場合は、自己の表示可能サイズを前記指標とすることを特徴とする請求項1記載のネットワークシステム。

【請求項7】 前記データ変換手段は、前記指標が前記クライアント端末の表示可能サイズの場合は、前記データを前記表示可能サイズ以下に変換することを特徴とする請求項6記載のネットワークシステム。

【請求項8】 前記指標付きデータ取得要求送信手段は、前記データがGIFの場合は、前記クライアント端末が表現できる色数を前記指標とすることを特徴とする請求項1記載のネットワークシステム。

【請求項9】 前記データ変換手段は、前記データが画像データで、前記通信網の通信状態が悪い場合には、前記画像データを変換して、前記画像データの品質を低下させることを特徴とする請求項1記載のネットワークシステム。

【請求項10】 前記中継サーバは、前記クライアント端末から再度、要求されたデータが同じ場合には、前記サーバにアクセスせずに、前記データ格納手段に格納されている前記データに対して、前記中継制御を行うことを特徴とする請求項1記載のネットワークシステム。

【請求項11】 前記中継サーバは、前記サーバ内のデータが更新されている場合には、前記サーバから更新された前記データを取得して前記中継制御を行い、前記サーバ内のデータが更新されていない場合には、前記データ格納手段内の前記データに対して前記中継制御を行うことを特徴とする請求項1記載のネットワークシステム。

【請求項12】 前記中継サーバは、前記クライアント端末が格納している前記データと、前記データ格納手段が格納している前記データと、のいずれか新しい前記データに対して前記中継制御を行うことを特徴とする請求項1記載のネットワークシステム。

【請求項13】 情報提供を行うサーバからデータを取得するクライアント端末において、

前記サーバから前記データを取得する際に、データ伝送情報に関する指標をデータ取得要求に付加し、指標付きデータ取得要求を生成して送信する指標付きデータ取得要求送信手段を有することを特徴とするクライアント端末。

【請求項14】 情報提供を行うサーバと、サーバからデータを取得するクライアント端末との中継制御を行う中継サーバにおいて、

前記サーバから取得した前記データを前記指標にもとづいて変換するデータ変換手段と、変換後のデータを格納するデータ格納手段と、を有することを特徴とする中継サーバ。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明はネットワークシステム、クライアント端末及び中継サーバに関し、特にクライアントサーバ型のネットワークでデータ伝送を行うネットワークシステム、情報提供を行うサーバからデータを取得するクライアント端末及び情報提供を行うサーバと、サーバからデータを取得するクライアント端末との中継制御を行う中継サーバに関する。

【0002】

【従来の技術】近年、ネットワーク技術の進歩に伴って、テキスト、画像、音声などを統合的に組み合わせて通信するマルチメディア通信の機運が急速に高まってきている。

【0003】マルチメディア通信では、ネットワーク上の他の端末に各種サービスを提供する際に、情報提供サーバを用いている。情報提供サーバは、テキストデータ、画像データ、音声データ、等のさまざまなマルチメディアデータを相手端末へ伝送する。

【0004】図17は情報提供サーバと端末とのデータ伝送構成を示す図である。端末200は、付属する通信網インタフェース（図示せず）を用いて通信網50と接続し、情報提供サーバ300はゲートウェイ400を介して通信網50と接続する。そして、端末200及び情

報提供サーバ300間とで通信が行われる。

【0005】端末200が情報提供サーバ300からデータをダウンロードする際、端末200と情報提供サーバ300間で物理的もしくは仮想的なコネクションを開設する。そして、このコネクション上で端末200からデータ取得要求がなされ、情報提供サーバ300からそのデータを伝送する。

【0006】この場合、端末200からのデータ取得要求には、情報提供サーバ300の持つデータの名称が指定されており、これを得た情報提供サーバ300はデータの名称と一致するデータを端末200へ伝送する。その後、コネクションを切断するか、再び他のデータへの取得要求がなされる。

【0007】

【発明が解決しようとする課題】しかし、上記のような従来のデータ伝送では、情報提供サーバ300は、通信網50の状態とは無関係に蓄積されたデータを伝送していた。このため、例えば通信網50の伝送能力が低い場合でも大量のデータを送ることになり、端末200がデータを取得するのに時間がかかるといった問題があった。

【0008】また、情報提供サーバ300は、相手端末の種別や処理能力を考慮せずに、蓄積されたデータをそのまま伝送していた。このため、端末200にデータを格納するだけのメモリがなかったり、端末200が表示できる能力を越えている表示データを伝送してしまったり等の問題があった。

【0009】本発明はこのような点に鑑みてなされたものであり、通信状態や端末の処理能力などの条件に応じてデータ変換を行って、効率よくデータ伝送を行うネットワークシステムを提供することを目的とする。

【0010】また、本発明の他の目的は、通信状態や端末の処理能力などの条件をデータに付加して送信し、効率よくデータ伝送を行うクライアント端末を提供することにある。

【0011】さらに、本発明の他の目的は、通信状態や端末の処理能力などの条件に応じてデータ変換を行って、効率よくデータ伝送を行う中継サーバを提供することにある。

【0012】

【課題を解決するための手段】本発明では上記課題を解決するために、クライアントサーバ型のネットワークでデータ伝送を行うネットワークシステムにおいて、情報提供を行うサーバと、前記サーバからデータを取得する際に、データ伝送情報に関する指標をデータ取得要求に付加し、指標付きデータ取得要求を生成して送信する指標付きデータ取得要求送信手段を含むクライアント端末と、前記サーバから取得した前記データを前記指標にもとづいて変換するデータ変換手段と、変換後のデータを格納するデータ格納手段と、から構成され、前記サーバ

と前記クライアント端末との中継制御を行う中継サーバと、を有することを特徴とするネットワークシステムが提供される。

【0013】ここで、指標付きデータ取得要求送信手段は、サーバからデータを取得する際に、データ伝送情報に関する指標をデータ取得要求に付加し、指標付きデータ取得要求を生成して送信する。データ変換手段は、サーバから取得したデータを指標にもとづいて変換する。データ格納手段は、変換後のデータを格納する。

【0014】

【発明の実施の形態】以下、本発明の実施の形態を図面を参照して説明する。図1は本発明のネットワークシステムの原理図である。ネットワークシステム10は、クライアントサーバ型のネットワーク構成をとり、通信網50を通じてデータ伝送を行う。

【0015】また、ネットワークシステム10は、情報提供を行うサーバ30と、サーバ30からデータを取得するクライアント端末20と、サーバ30とクライアント端末20との中継制御を行う中継サーバ40と、から構成される。

【0016】指標付きデータ取得要求送信手段21は、クライアント端末20がサーバ30からデータを取得する際に、データ伝送情報に関する指標をデータ取得要求に付加し、指標付きデータ取得要求Cを生成して送信する。

【0017】ここでデータ伝送情報とは、通信網50の通信状態及びクライアント端末20自身の処理能力等を意味する。中継サーバ40は、この指標付きデータ取得要求Cをサーバ30へ送信し、該当するデータD1をサーバ30から取得する。

【0018】データ変換手段41は、サーバ30から取得したデータD1を指標にもとづいて変換し、データ格納手段42は、変換後のデータD2を格納する。その後、中継サーバ40は、変換後のデータD2をクライアント端末20へ送信する。

【0019】なお、中継サーバ40が行う中継制御とは、クライアント端末20とサーバ30間で送受信するデータに対して、指標にもとづいて変換したり、変換の必要がなければ変換せずにデータを送信したりといった伝送制御を意味する。

【0020】次に本発明のネットワークシステム10の具体的な構成について説明する。図2はネットワークシステム10の構成を示す図である。ここで本発明のクライアント端末20（以下、携帯端末20と呼ぶ。）は、PHS機能を持つものとする。また、携帯端末20と、サーバ30とは、インターネット上でデータ伝送を行うものとする。

【0021】携帯端末20は、基地局51を介して無線通信を行う。基地局51はISDN網52と接続する。ISDN網52及びLAN54は、互いにアクセスする

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際の受付口となるアクセスポイント53を介して接続する。

【0022】LAN54には、携帯端末20及びサーバ30との中継制御を行う中継サーバ40と、データベース30aを有するサーバ30と、が接続する。次にネットワークシステム10でのデータ伝送におけるプロトコルスタックについて説明する。図3はプロトコルスタックを示す図である。

【0023】携帯端末20のレイヤ構成は、上位からHTTP (Hyper Text Transfer Protocol)、TCP/IP、PPP、PIAFS、STD28で構成される。基地局51の携帯端末20側のレイヤ構成は、上位からHTTP、TCP/IP、PPP、PIAFS、STD28で構成される。また、基地局51のISDN網52側のレイヤ構成は、上位からHTTP、TCP/IP、PPP、PIAFS、ISDNで構成される。

【0024】アクセスポイント53のISDN網52側のレイヤ構成は、上位からHTTP、TCP/IP、PPP、PIAFS、ISDNで構成される。アクセスポイント53のLAN54側のレイヤ構成は、上位からHTTP、TCP/IP、MAC、物理で構成される。

【0025】中継サーバ40のレイヤ構成は、HTTP、TCP/IP、MAC、物理で構成される。サーバ30のレイヤ構成は、HTTP、TCP/IP、MAC、物理で構成される。

【0026】このように、上位レイヤにはHTML (Hyper Text Markup Language) のハイパーテキストを取り取るためのプロトコルHTTPを用い、その下のレイヤでTCP/IPを用いている。そして、これ以下のレイヤでは各装置に合わせるためのプロトコルを用い、各装置で適宜プロトコル変換が行われる。

【0027】データ伝送時には、まず携帯端末20とアクセスポイント53の間では、PPPが用いられ、1対1のコネクションを確定する。さらにこの場合、携帯端末20とアクセスポイント53間ではPIAFSを用いている。PIAFSとは、PHSの伝送方式をサポートする端末と端末間でエラーフリーな伝送を行うための伝送方式である。

【0028】ここではアクセスポイント53にてPHSの無線区間でのエラーフリーを保証し、LAN54へとデータを流すものとする。次にネットワークシステム10の詳細動作について説明する。図4は中継サーバ40を通して、データ変換を行う際の処理手順を示すシーケンス図である。

【S1】携帯端末20と、アクセスポイント53と、の間でPIAFSのリンクが開設する。

【S2】PIAFSのリンク上にPPPのリンクが開設する。これにより、アクセスポイント53を通じて、携帯端末20とサーバ30とが物理的につながる。

【S3】携帯端末20と、中継サーバ40と、の間でT

CP/IPのリンクが開設する。

【S4】携帯端末20は、TCP/IPの仮想コネクション上で、HTTPリクエストにより、データ取得要求を出す。

【0029】この場合、本発明では携帯端末20の処理能力や通信状態に関する指標をデータ取得要求に含めて、指標付きデータ取得要求を生成して送信する。指標付きデータ取得要求の生成には、URI (Universal Resource Identifier)に指標を含める場合と、HTTPヘッダに指標を含める場合と、がある。詳細は後述する。

【S5】中継サーバ40と、サーバ30と、の間でTCP/IPのリンクが開設する。

【S6】中継サーバ40はデータ取得要求をサーバ30に送る。

【S7】サーバ30はデータベース照会言語であるSQLを使ってデータベース30aから、要求を受けたデータを取り出し、中継サーバ40に送信する。

【S8】中継サーバ40と、サーバ30と、の間でTCP/IPのリンクが切断する。

【S9】中継サーバ40のデータ変換手段41は、指標にもとづいてデータを変換する。そして、中継サーバ40は変換したデータを中継サーバ40上のディスク(データ格納手段42に該当する。)に書き込む。

【0030】このように変換後のデータを書き込んで保存することにより、次に同じ端末条件、同じ通信条件の指標が付加されたデータ取得要求がきたときには、新たにサーバ30にアクセスすることなく、変換済みデータを携帯端末20に送り返せばよい。なお、携帯端末20はPHS機能を有するため、電界強度などが通信条件として指標に記載される。

【S10】中継サーバ40は、変換後のデータを携帯端末20へ送信する。

【S11】中継サーバ40と、携帯端末20と、の間でTCP/IPのリンクが切断する。

【S12】携帯端末20と、アクセスポイント53と、の間でPPPのリンクが切断する。

【S13】携帯端末20と、アクセスポイント53と、の間でPIAFSのリンクが切断する。

【0031】以上説明したように、本発明のネットワークシステム10は、指標付きデータ取得要求を送信して、中継サーバ40でサーバ30から取得したデータを指標にもとづいて変換した後、携帯端末20へ送信する構成とした。

【0032】これにより、サーバ30、中継サーバ40及びネットワークの負荷を軽減することが可能になる。次に図5及び図6を用いて指標付きデータ取得要求の生成について説明する。図5はURIに指標を含めた場合の指標付きデータ取得要求を示す図である。

【0033】URIに指標を含めた場合の指標付きデータ取得要求C1は、実際のURI1aに続けて、指標1

bを付加している。この指標1bでデータ伝送情報の状態を指定している。なお、www.hoge.co.jpは、WWWのサーバ30の名前である。

【0034】図6はHTTPヘッダに指標を含めた場合の指標付きデータ取得要求を示す図である。指標付きデータ取得要求C2は、HTTPヘッダ2a内に、指標2bを付加している。

【0035】このようにHTTPのヘッダの拡張を利用して、HTTPプロトコルの中に指標2bを埋め込む。そして、この指標2bでデータ伝送情報の状態を指定する。なお、図5の指標1a及び図6の指標2bのいずれに対しても、携帯端末20の能力が低く、通信品質が悪いことを示している。

【0036】したがって、データ変換する際には、携帯端末20が低処理能力で低通信品質であるため、データがなるべく少なくなるように変換を行う。具体的には、通信すべきデータがカラー画像であれば、カラー画像データを白黒の16階調に変換するなどが考えられる。

【0037】次に端末条件や通信条件が、以前通信を行った際の条件と異なる場合でのデータ伝送について説明する。図7は端末条件や通信条件が以前の条件と異なる場合でのデータ伝送の処理手順を示すシーケンス図である。なお、PPPリンク開設後から説明する。

【S20】携帯端末20と、中継サーバ40と、の間でTCP/IPのリンクが開設する。

【S21】携帯端末20は、TCP/IPの仮想コネクション上で、指標付きデータ取得要求を出す。

【S22】中継サーバ40は、格納してある元のデータを読み出し、指標にもとづいてデータを変換する。そして、中継サーバ40は変換したデータをディスクに書き込む。

【S23】中継サーバ40は、変換後のデータを携帯端末20へ送信する。

【S24】中継サーバ40と、携帯端末20と、の間でTCP/IPのリンクが切断する。

【0038】このように、同じデータ取得要求であった場合でも端末条件や通信条件が以前の条件と異なる場合には、あらかじめ中継サーバ40に蓄積しておいたデータを変換すればよい。これによりサーバ30の負荷、ネットワークの負荷を軽減することが可能になる。

【0039】次にサーバ30内のデータが更新された場合についてのデータ伝送について説明する。上述したシーケンスでは、サーバ30でのデータ更新がない場合を前提としたが、実際にはサーバ30でデータが更新され、中継サーバ40に蓄積してあるデータが古くなっている場合も考えられる。

【0040】したがって、サーバ30内のデータ更新情報を中継サーバ40が知って、更新制御を行う必要がある。この場合、サーバ30から返されるHTTPレスポンスのヘッダ中のlast-modifiedヘッダを用いる。この

last-modifiedヘッダには、サーバ30でのデータの最終更新時間が記載されている。

【0041】中継サーバ40では、この最終更新時間をデータとともにファイルに格納しておく。そして、次に携帯端末20から同じデータへの取得要求があった場合、サーバ30にデータ取得要求をする際、この最終更新時間を含めて要求する。

【0042】これにはHTTPリクエストヘッダ中のif-modified-sinceヘッダに含めることになる。このヘッダを含んだ要求を受けたサーバ30は、その最終更新時間よりも最近にデータを更新していた場合には、HTTPのレスポンスの際“200OK”を返し、通常どおりデータを送り返す。その後の中継サーバ40の動作は同様である。

【0043】また、最終更新時間が変わっていなければ、サーバ30はHTTPのレスポンスで“304not modified”を返し、データは送り返さない。したがって、このHTTPレスポンスを受けた中継サーバ40は、自分が持つデータが最新であると判断することができ、変換する必要があれば、変換して携帯端末20に送り返す。

【0044】図8はサーバ30内のデータが更新されていない場合での更新制御を伴ったデータ伝送の処理手順を示すシーケンス図である。なお、TCP/IPリンク開設後から説明する。

【S30】携帯端末20は中継サーバ40へ指標付きデータ取得要求を送信する。

【S31】中継サーバ40は、サーバ30内のデータが更新されたか否かを知るために、データ取得要求をする際、最終更新時間を含めて要求する。

【S32】サーバ30は、最終更新時間が変わっていないので、ヘッダのみ中継サーバ40に送信する。

【S33】中継サーバ40は、ヘッダ内の最終更新時間からデータが更新されていないことを知り、すでに格納しているデータを読みだす。

【S34】中継サーバ40は、変換済みのデータを携帯端末20へ送信する。

【0045】図9はサーバ30内のデータが更新されている場合での更新制御を伴ったデータ伝送処理手順を示すシーケンス図である。なお、TCP/IPリンク開設後から説明する。

【S40】携帯端末20は中継サーバ40へ指標付きデータ取得要求を送信する。

【S41】中継サーバ40は、サーバ30内のデータが更新されたか否かを知るために、データ取得要求をする際、最終更新時間を含めて要求する。

【S42】サーバ30は最終更新時間が変わっているので、データベース照会言語であるSQLを使ってデータベース30aから、要求を受けた最新のデータを取り出し、最終更新時間も含めて中継サーバ40に送信する。

〔S43〕中継サーバ40は、最終更新時間から更新されていることを知り、データを指標にもとづいて変換し、ディスクに書き込む。

〔S44〕中継サーバ40は、変換後のデータを携帯端末20へ送信する。

〔0046〕次に携帯端末20からの最終更新時間にもとづいて、データ伝送を行う場合について説明する。上述したデータ伝送は携帯端末20から初めてデータを取得することを前提にしていたが、実際には携帯端末20内にすでに情報がある場合もありうる。

〔0047〕例えば、頻繁にアクセスするような情報を携帯端末20内のキャッシュメモリ（以下、キャッシュ）が蓄えておくような場合である。この場合もサーバ30から送られるlast-modified ヘッダを用いて行われる。すなわち、すでにデータを携帯端末20のキャッシュに持っている場合、携帯端末20は、キャッシュデータから最終更新時間（last-modified フィールドから得たもの）を取得する。

〔0048〕そして、サーバ30に指標付きデータ取得要求を出す際に、ヘッダにif-modified-since フィールドを付け、先ほど取得した最終更新時間を付加する。これを得た中継サーバ40は、そのデータが中継サーバ40内に格納されており、かつその最終更新時間より新しければ、そのデータを携帯端末20に返す。

〔0049〕また、同じ更新時間であればデータを返さずに“304n not modified”のステータスコードのヘッダのみを返す。さらに、携帯端末20のデータより中継サーバ40内のデータが古ければ、サーバ30からデータを取得する。その際、携帯端末20の条件に合ったデータでなければ、指標にもとづいて変換処理を行う。

〔0050〕図10は携帯端末20にキャッシュがあるが、携帯端末20内のデータが古い場合のデータ伝送の処理手順を示すシーケンス図である。なお、TCP/IPリンク開設後から説明する。

〔S50〕携帯端末20は最終更新時間を含めた指標付きデータ取得要求を送信する。

〔S51〕中継サーバ40は、最終更新時間より携帯端末20内のデータが古いことを知り、変換済みデータを読みだす。

〔S52〕中継サーバ40は、変換後のデータを携帯端末20へ送信する。

〔0051〕図11は携帯端末20にキャッシュがあり、携帯端末20内のデータが最新の場合のデータ伝送の処理手順を示すシーケンス図である。なお、TCP/IPリンク開設後から説明する。

〔S60〕携帯端末20は最終更新時間を含めた指標付きデータ取得要求を送信する。

〔S61〕中継サーバ40は、最終更新時間より携帯端末20内のデータが最新であることを知り、ヘッダのみ

送信する。

〔0052〕図12は携帯端末20にキャッシュがあり、携帯端末20内のデータが中継サーバ40のデータより新しい場合のデータ伝送の処理手順を示すシーケンス図である。なお、TCP/IPリンク開設後から説明する。

〔S70〕携帯端末20は最終更新時間を含めた指標付きデータ取得要求を送信する。

〔S71〕中継サーバ40は、最終更新時間より中継サーバ40内のデータが携帯端末20内のデータより古いことを知り、サーバ30にデータ取得要求をする際、最終更新時間を含めて要求する。

〔S72〕サーバ30はデータベース照会言語であるSQLを使ってデータベース30aから、要求を受けた最新のデータを取り出し、最終更新時間も含めて中継サーバ40に送信する。

〔S73〕中継サーバ40は、取得した最新のデータを指標にもとづいて変換し、ディスクに書き込む。

〔S74〕中継サーバ40は、変換後のデータを携帯端末20へ送信する。

〔0053〕次にデータ変換について説明する。サーバ30から取得するマルチメディアデータには様々な種類があるが、ここではHTMLで記述されたテキストデータ、GIF (Graphics Interchange Format) による画像データ、JPEGフォーマットによる画像データを対象にする。

〔0054〕まず、携帯端末20のHTMLのデータ処理能力に対応して、データ変換される場合を考える。HTMLのフォーマットには現在も数々の改良が重ねられている。

〔0055〕このため携帯端末20のビューワが、古いHTMLにしか対応できない場合には、新しいHTMLフォーマットのデータを解釈することができない。図13は指標付きデータ取得要求を示す図である。ビューワ100は、携帯端末20の処理能力として、HTMLのバージョン1.0に対応していることを示しており、この指標付きデータ取得要求が送信される。

〔0056〕図14は中継サーバ40がサーバ30から取得したHTMLを示す図である。ビューワ101は、携帯端末20からのデータ取得要求にもとづいて、中継サーバ40がサーバ30から取得したHTMLを示している。

〔0057〕図15はデータ変換後のHTMLを示す図である。ビューワ102はデータ変換後のHTMLを示しており、このHTMLが携帯端末20上に表示される。すなわち、図14のデータ部分101aは、<FRAMESET>というHTMLのバージョン3.2のフォーマットであるため、携帯端末20が有するビューワでは解釈できず、<BODY>以降のみしか解釈できない。

〔0058〕したがって、中継サーバ40では、解釈で

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きないデータ部分101aを削除して図15のようなデータに変換し、携帯端末20へ送信する。次にデータが画像ファイルの場合の変換について説明する。画像ファイルにはカラー、白黒、高精度、低精度、高品質、低品質などさまざまなものがあり、画素数もさまざまである。

【0059】例えば携帯端末20が白黒でメモリが少ない場合は、カラーで高精度、高品質のデータを取得しても見ることができない。また、表示できる大きさが限られた携帯端末20では、広大な画像は見ることができない。さらに通信状態が悪いときに大きな画像データを伝送しようとする、データの取得に途中で失敗したり、データ伝送に時間がかかったりする。

【0060】図16は画像ファイルの変換テーブルを示す図である。テーブル110には、携帯端末20及び通信状態の状況によって、適切に変換を行う際の変換方法が記載されている。

【0061】例えば、携帯端末20が白黒表示の処理能力である場合、対象フォーマットがGIFであれば、カラー画像をgrayscaleの2、4、8、16のいずれかの階調に変換する。

【0062】なお、GIF、JPEGともに画像サイズの増減は可能であり、GIFは色数を指定することができるが、JPEGは色数は指定できない。また、JPEGでは画像品質を指定することができるがGIFはできない。

【0063】以上説明したように、本発明のネットワークシステム10は、データの取得の際、クライアント端末20、中継サーバ40間の通信網50の状態や端末自身の処理能力を考慮して、中継サーバ40でデータを変換して取得する構成とした。

【0064】これにより、データ量が縮小され、また冗長なデータを削減することができ、効率的にデータ伝送が行えるという効果が得られる。さらに、データ取得要求の際、中継サーバ40でデータ変換後にデータを蓄積しておくことにより、2回目以降の取得要求に対し変換済みファイルにアクセスするだけになるので、中継サーバ40の負荷及びサーバ30の負荷を軽減することが可能になる。

【0065】

【発明の効果】以上説明したように本発明のネットワークシステムは、クライアント端末がサーバからデータを取得する際に、データ伝送情報に関する指標をデータ取得要求に付加して送信し、中継サーバでサーバから取得したデータを指標にもとづいて変換した後、クライアント端末へ送信する構成とした。これにより、サーバと、クライアント端末間で、通信網の通信状態や自己の処理能力等の条件に合ったデータの送受信を行うことができるので、効率のよいデータ伝送が可能になる。

【0066】また、本発明のクライアント端末は、サー

バからデータを取得する際に、データ伝送情報に関する指標をデータ取得要求に付加して送信する構成とした。これにより、通信網の通信状態や自己の処理能力等の条件を情報提供側へ通知することができるので、効率のよいデータ伝送が可能になる。

【0067】さらに、本発明の中継サーバは、サーバから取得したデータを指標にもとづいて変換した後、クライアント端末へ送信する構成とした。これにより、通信網の通信状態や自己の処理能力等の条件に合ったデータをクライアント端末へ送信できるので、効率のよいデータ伝送が可能になる。

【図面の簡単な説明】

【図1】本発明のネットワークシステムの原理図である。

【図2】ネットワークシステムの構成を示す図である。

【図3】プロトコルスタックを示す図である。

【図4】中継サーバを通して、データ変換を行う際の処理手順を示すシーケンス図である。

【図5】URIに指標を含めた場合の指標付きデータ取得要求を示す図である。

【図6】HTTPヘッダに指標を含めた場合の指標付きデータ取得要求を示す図である。

【図7】端末条件や通信条件が以前の条件と異なる場合でのデータ伝送の処理手順を示すシーケンス図である。

【図8】サーバ内のデータが更新されていない場合での更新制御を伴ったデータ伝送の処理手順を示すシーケンス図である。

【図9】サーバ内のデータが更新されている場合での更新制御を伴ったデータ伝送処理手順を示すシーケンス図である。

【図10】携帯端末にキャッシュがあるが、携帯端末内のデータが古い場合のデータ伝送の処理手順を示すシーケンス図である。

【図11】携帯端末にキャッシュがあり、携帯端末内のデータが最新の場合のデータ伝送の処理手順を示すシーケンス図である。

【図12】携帯端末にキャッシュがあり、携帯端末内のデータが中継サーバのデータより新しい場合のデータ伝送の処理手順を示すシーケンス図である。

【図13】指標付きデータ取得要求を示す図である。

【図14】中継サーバがサーバから取得したHTMLを示す図である。

【図15】データ変換後のHTMLを示す図である。

【図16】画像ファイルの変換テーブルを示す図である。

【図17】情報提供サーバと端末とのデータ伝送構成を示す図である。

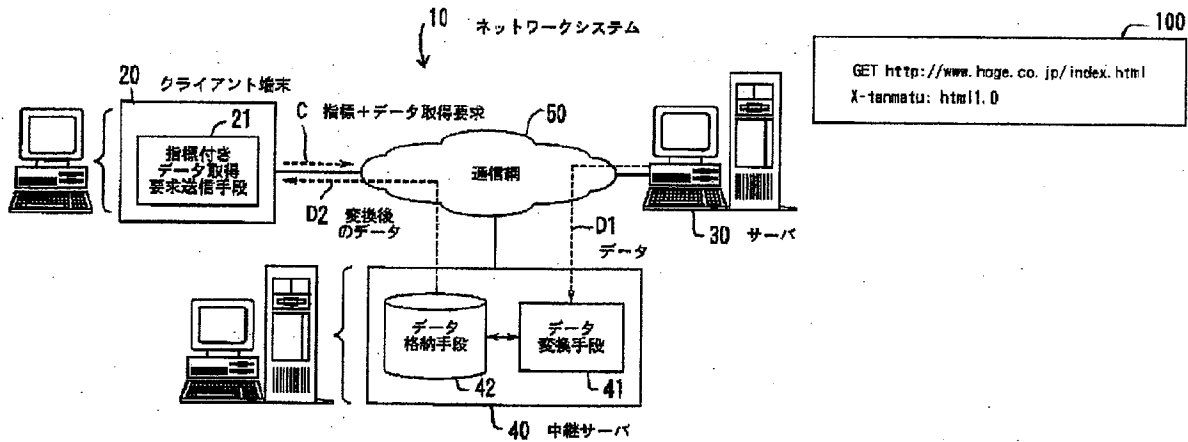
【符号の説明】

10……ネットワークシステム、20……クライアント端末、21……指標付きデータ取得要求送信手段、30

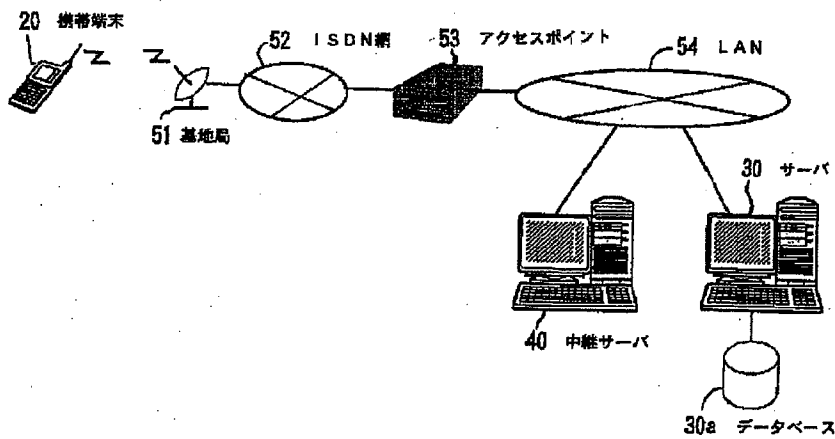
……サーバ、40……中継サーバ、41……データ変換 * 取得要求、D1……データ、D2……変換後のデータ。
手段、42……データ格納手段、C……指標付きデータ*

【図1】

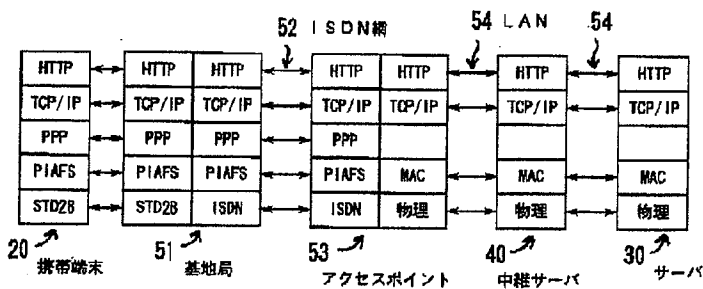
【図13】



【図2】

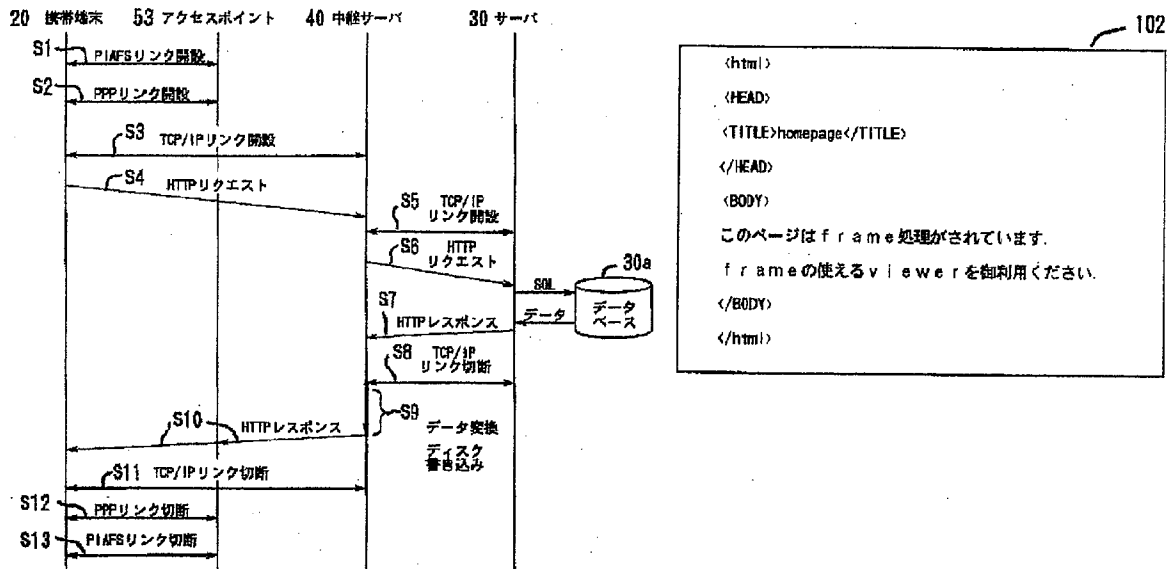


【図3】

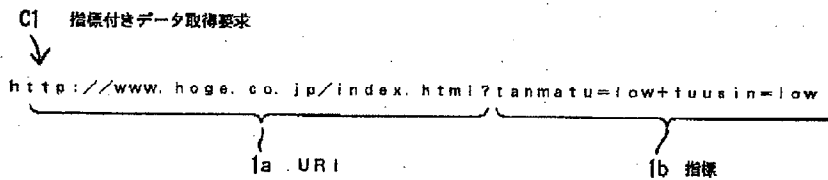


【図4】

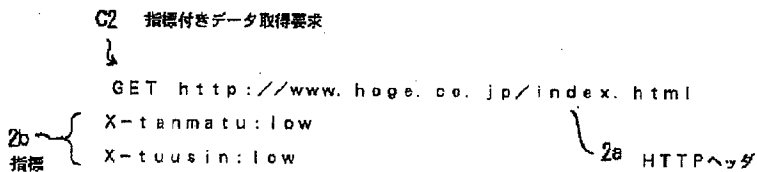
【図15】



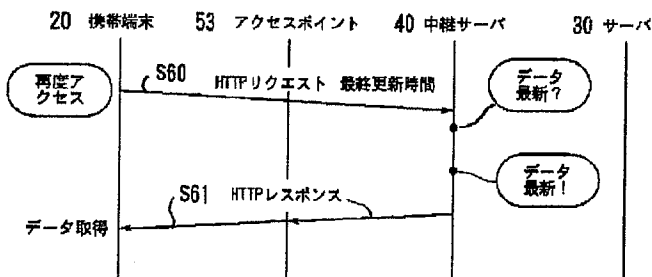
【図5】



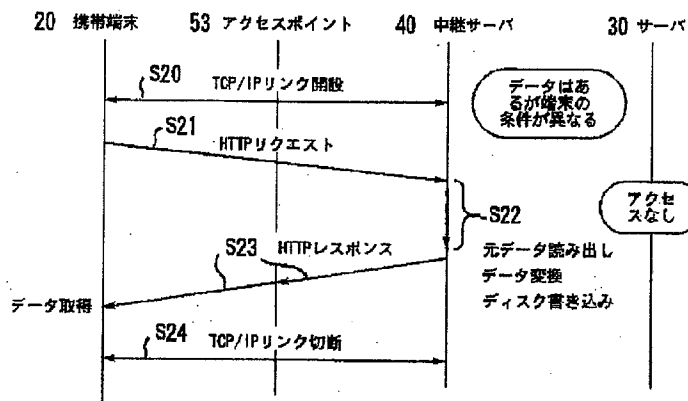
【図6】



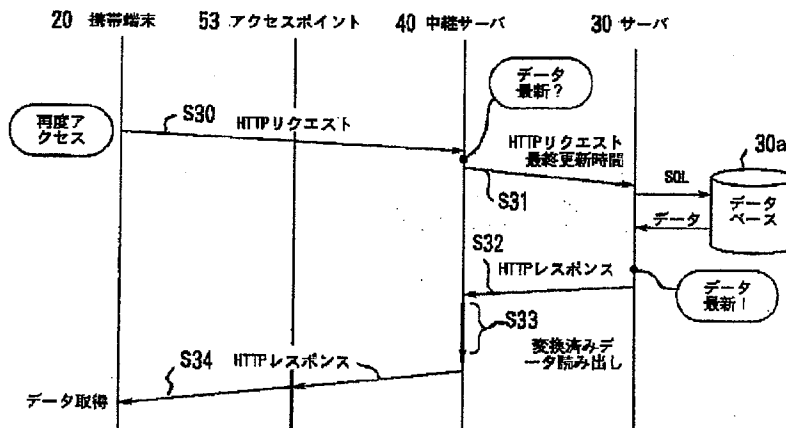
【図11】



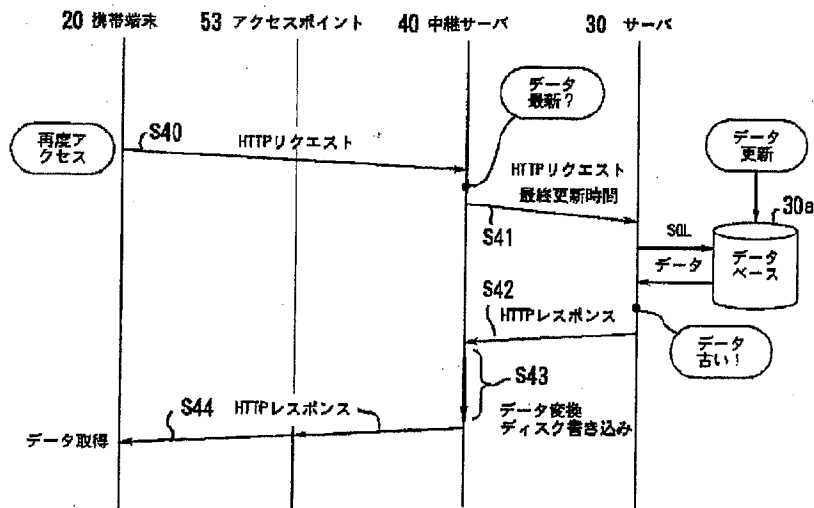
【図7】



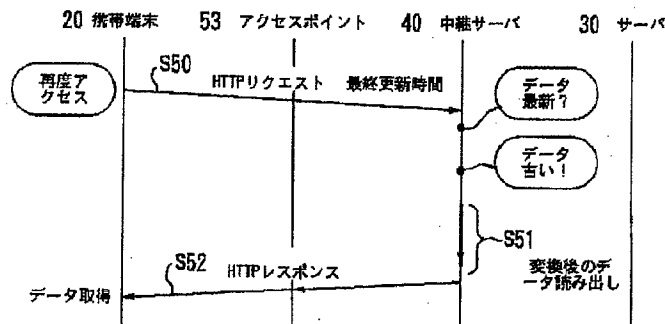
【図8】



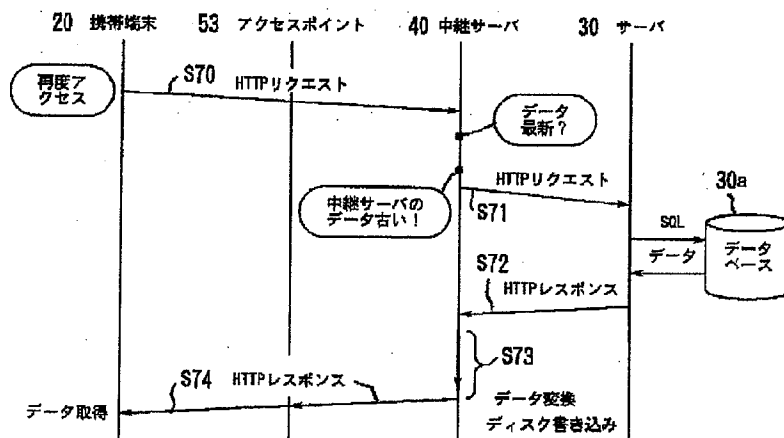
【図9】



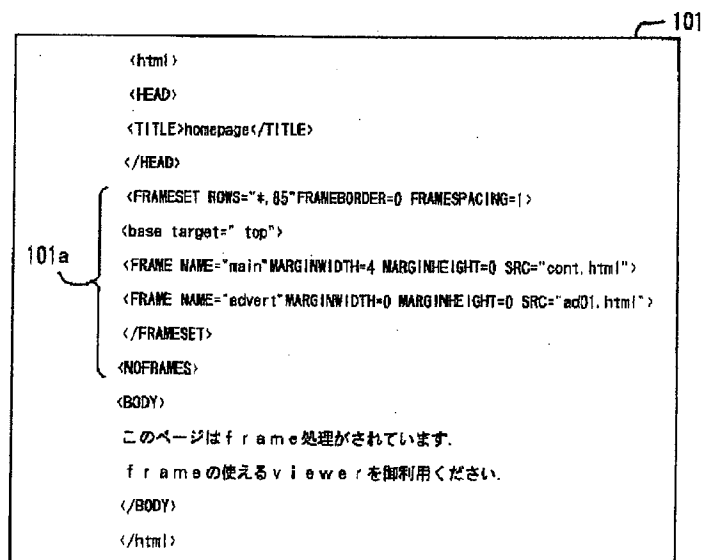
【図10】



【図12】



【図14】



【図16】

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端末	通信	変換方法	対象画像フォーマット
白黒	——	grayscale 2、4、8、16 階調	G I F
白黒	——	grayscale	J P E G
メモリ小	——	画像サイズ縮小	G I F、J P E G
——	低品質	画像サイズ縮小	G I F、J P E G
——	低品質	画像品質低下	J P E G

【図17】

